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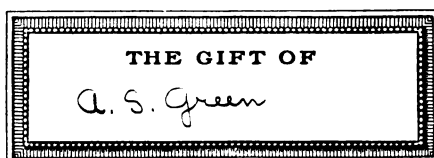
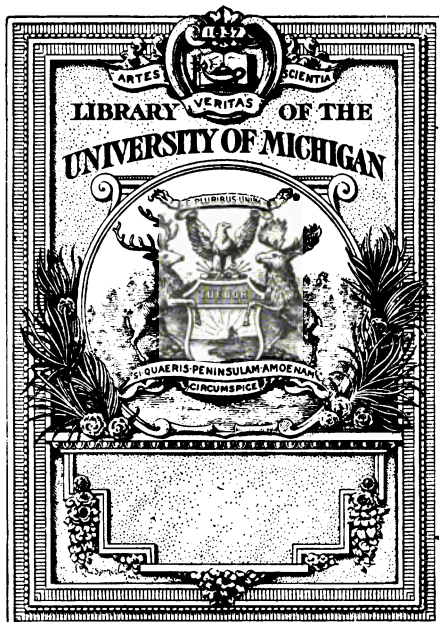
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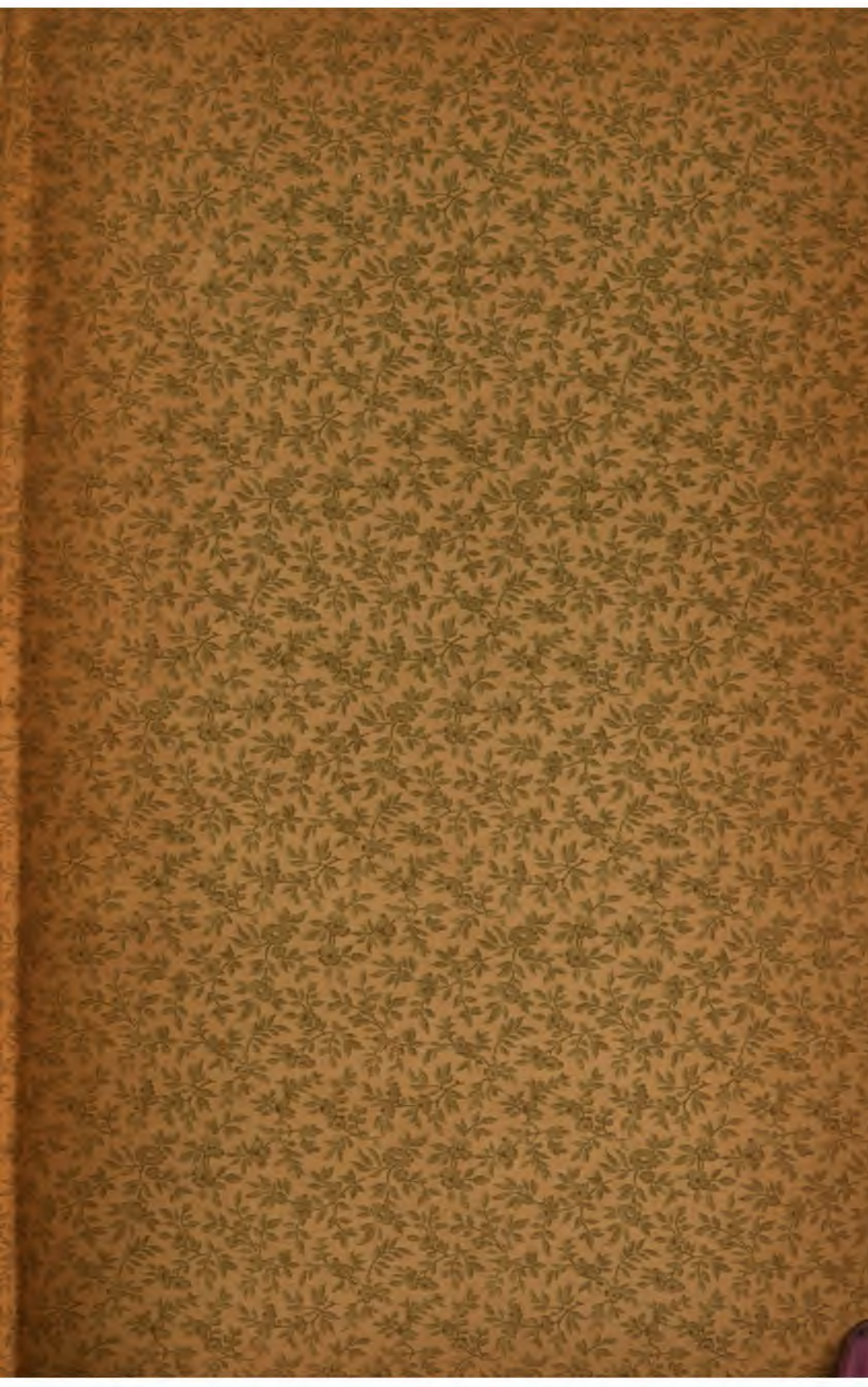
THIRTY-SEVENTH ANNUAL REPORT
OF THE
HEALTH DEPARTMENT



OF THE
CITY OF BOSTON

1908





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THIRTY-SEVENTH ANNUAL REPORT

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OF THE

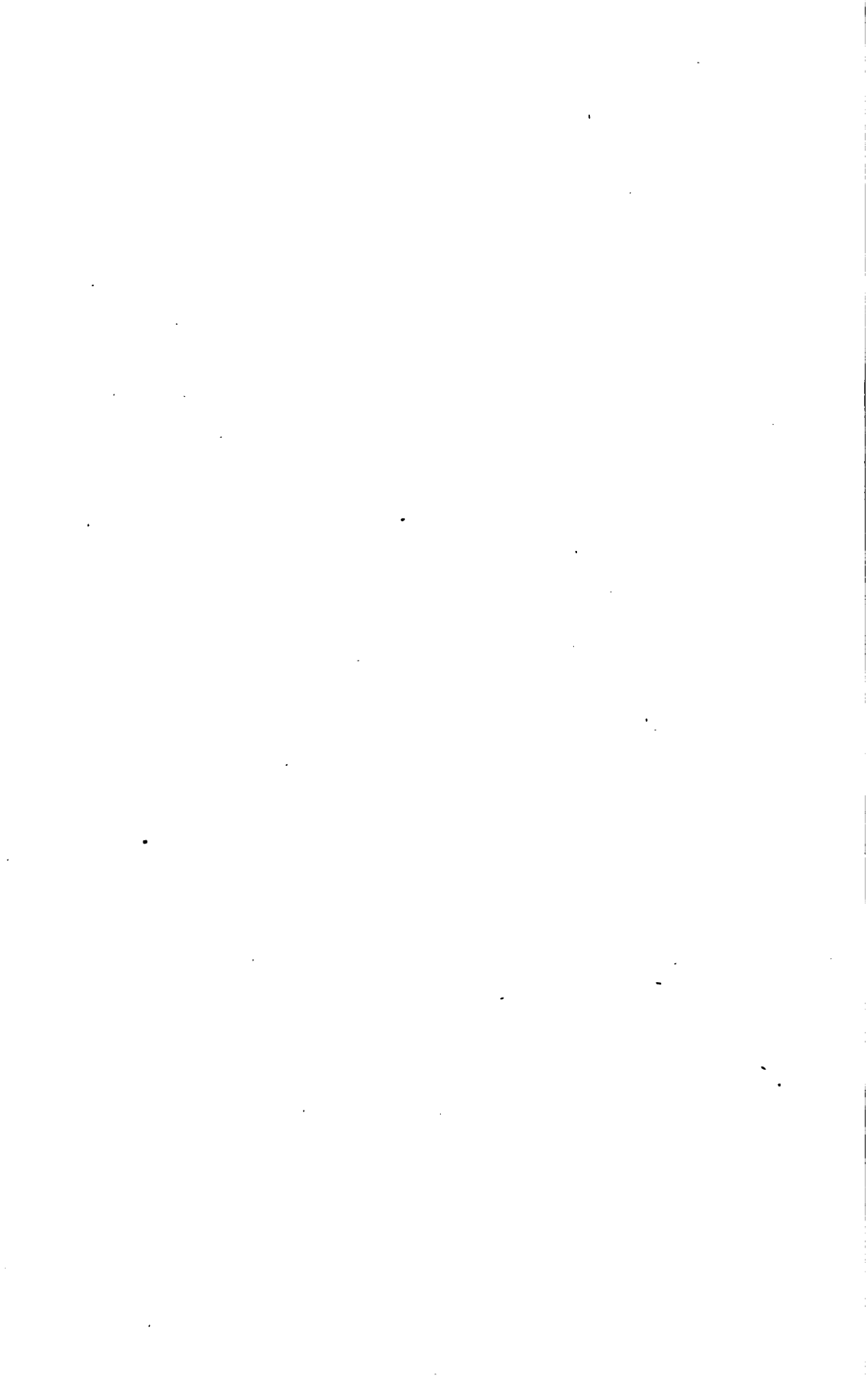
CITY OF BOSTON

FOR THE YEAR 1908



CITY OF BOSTON
PRINTING DEPARTMENT

1909



ORGANIZATION OF THE HEALTH DEPARTMENT.

SAMUEL H. DURGIN, M. D., *Chairman.*

FREDERIC O. NORTH.

JOHN RITCHIE, JR.

CHARLES E. DAVIS, JR., *Secretary.*

STATISTICAL SUMMARY, 1908.

Area of the city . . .	42.65 square miles or 27,300 acres.
Population (census 1905)	595,380
Population (estimated 1908)	617,075
Births *	18,347
Birth rate per 1,000 inhabitants	29.73
Deaths	11,776
Death rate per 1,000 inhabitants	19.08
Death rate of children under one year per 1,000 births	148.62
Death rate from pulmonary, laryngeal and general tuberculosis	1.77

* All figures for Boston births are from the Registry Department.

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ANNUAL REPORT
OF THE
HEALTH DEPARTMENT.
FOR THE YEAR 1908-09.

Boston, February 1, 1909.

HON. GEORGE A. HIBBARD,
Mayor of the City of Boston:

SIR,—The Board of Health respectfully presents the thirty-seventh annual report of the department, covering its operations for the financial year ending January 31, 1909, and the mortality statistics for the calendar year ending December 31, 1908. The general health of the city for the past year, so far as it may be judged by the total mortality and its classified causes, compares favorably with preceding years.

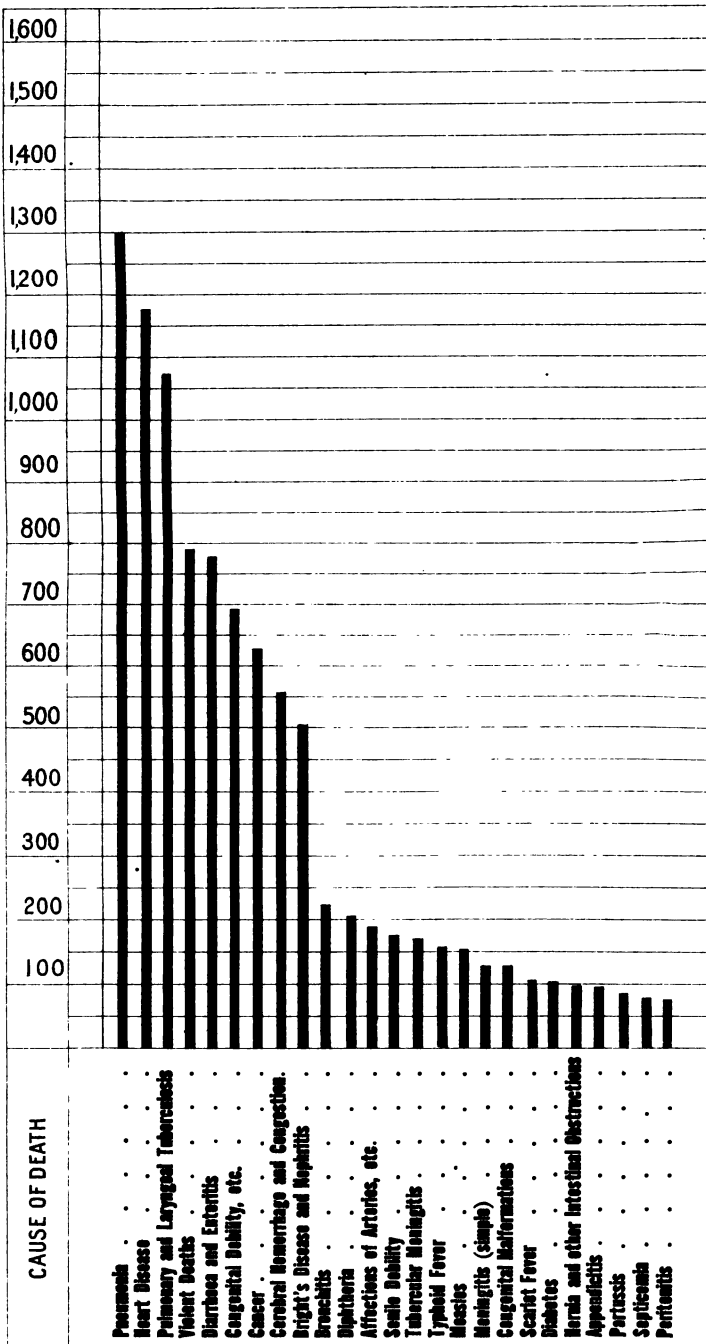
The total number of deaths for the year was 11,776, an increase over the previous year of 90 deaths. The estimated population, in the middle of the year, is 617,075. The death rate for the year, as calculated on this population, is 19.08 per 1,000 inhabitants. This rate was less by .08 than that of the previous year, and lower by .24 than the average of the previous ten years. There were 60 more deaths from diphtheria and croup than in 1907, and an increase in the number of cases. The percentage of deaths to the number of cases of diphtheria reported was 6.38, as against 6.09 per cent the preceding year. There were 104 deaths from scarlatina, 55 more deaths than in the preceding year, and 22 deaths more than the average for the ten previous years. Typhoid fever

caused 159 deaths during the year, 95 more deaths than the preceding year; 87 of the deaths from this cause occurred during the months of April and May, and 88 of the whole number died between the ages of twenty and forty years.

There were 151 deaths from measles during the year. The number of deaths of children under five years of age was 3,894, compared with 3,160 for the previous year, showing an increase of 734 deaths. The respiratory diseases caused 14 per cent of the mortality for the past year.

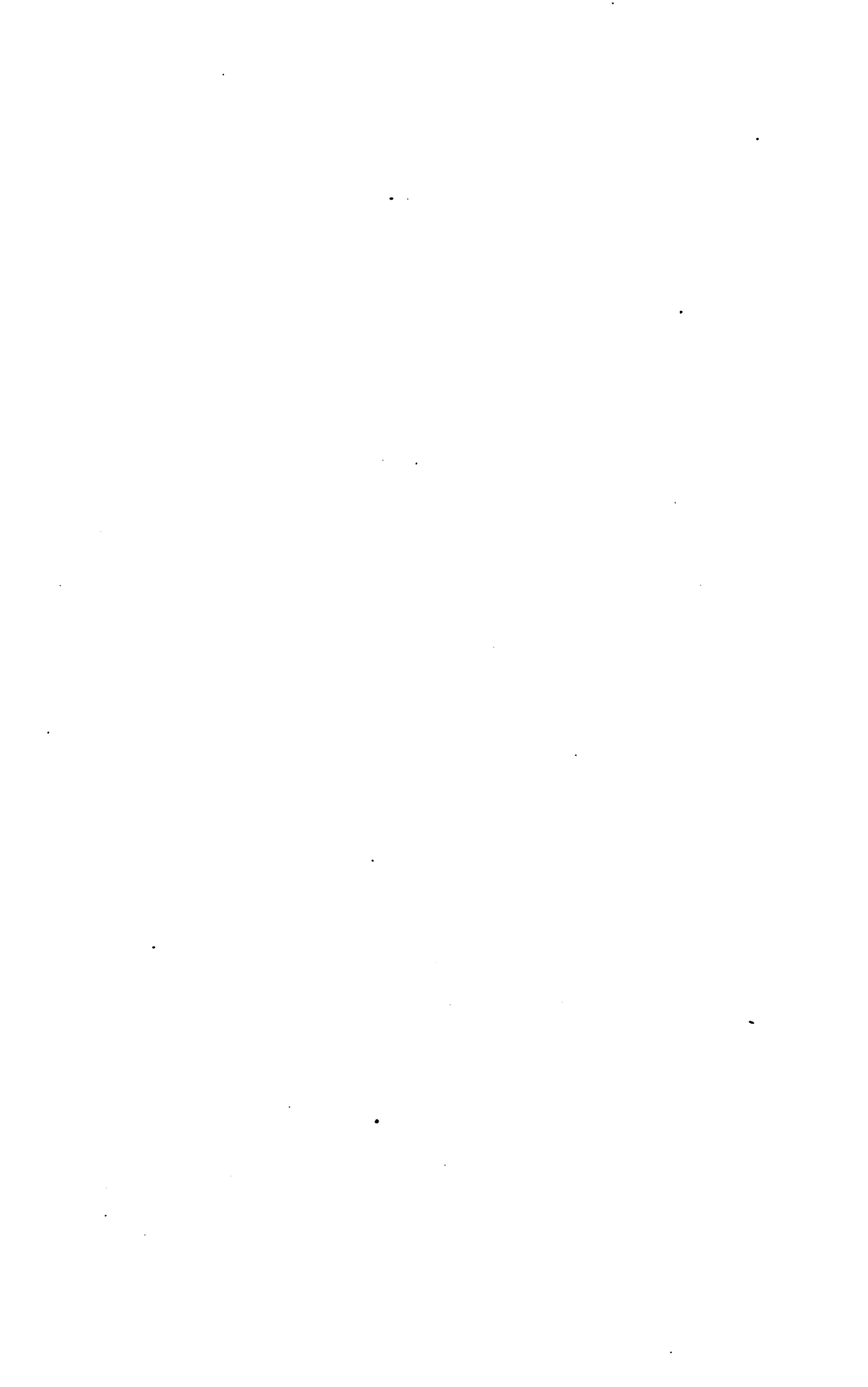
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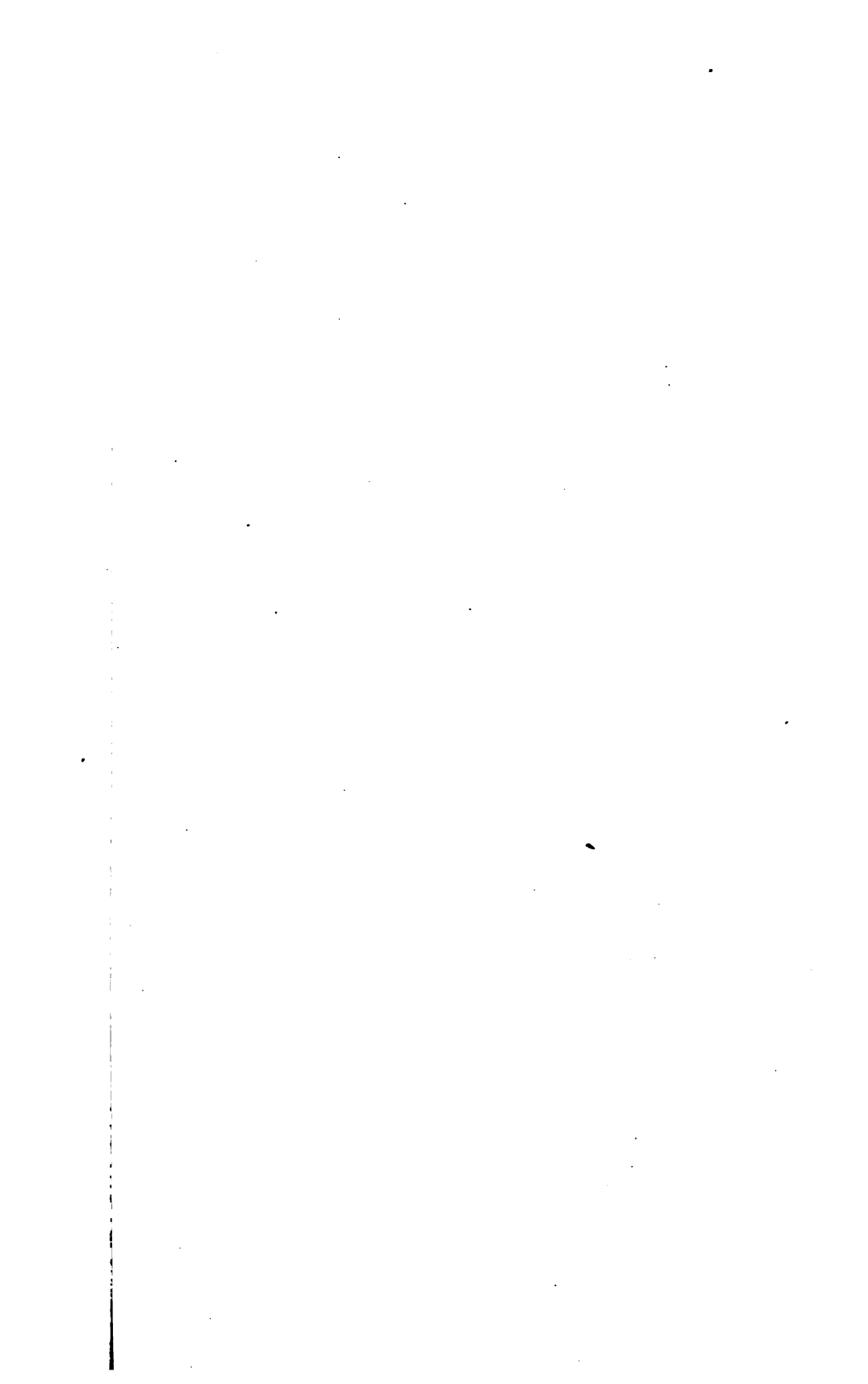
Comparative View of Twenty-five of the Principal Causes of Death during the Year 1908.

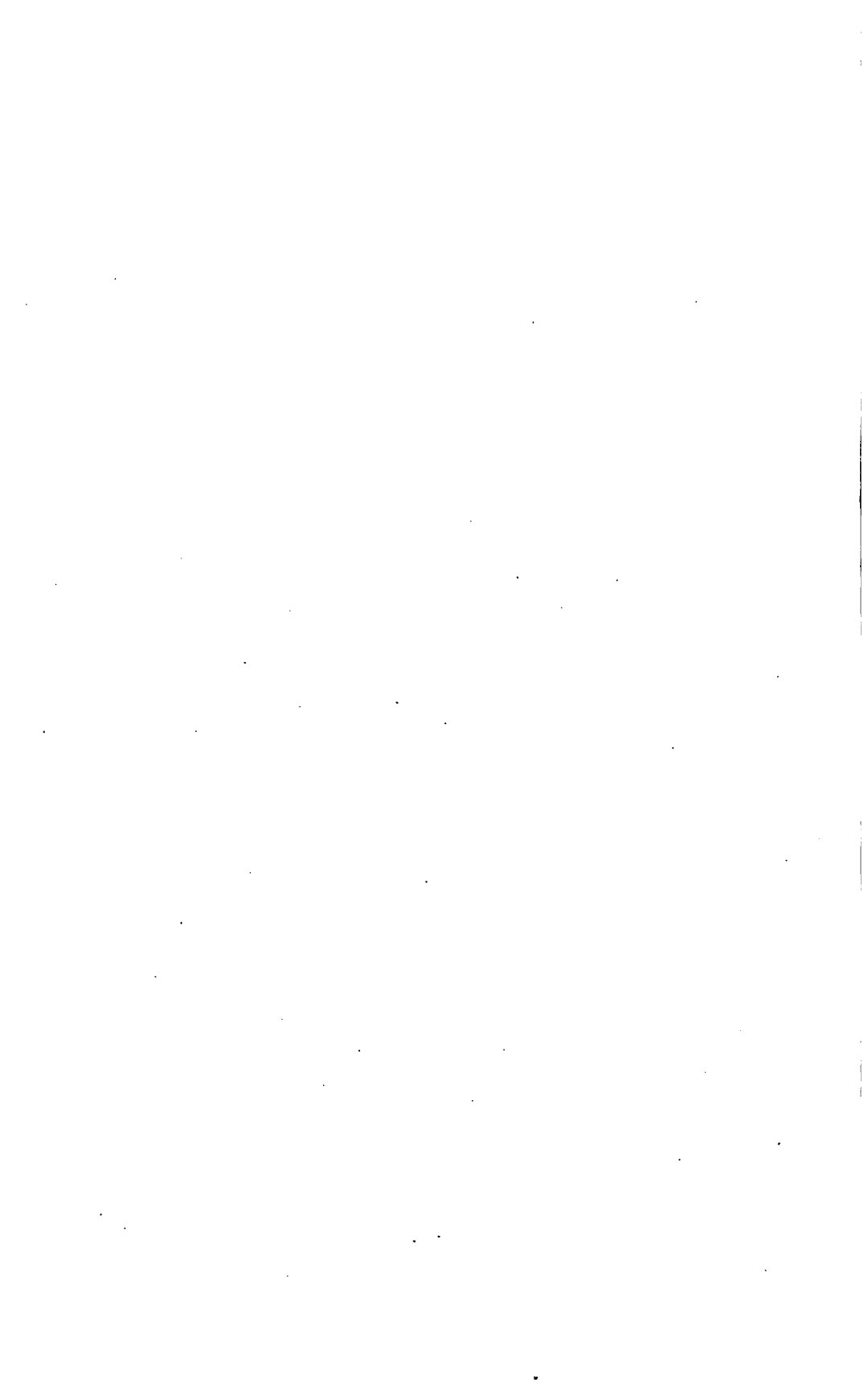


Deaths from Infectious Diseases.

Deaths from other Diseases.







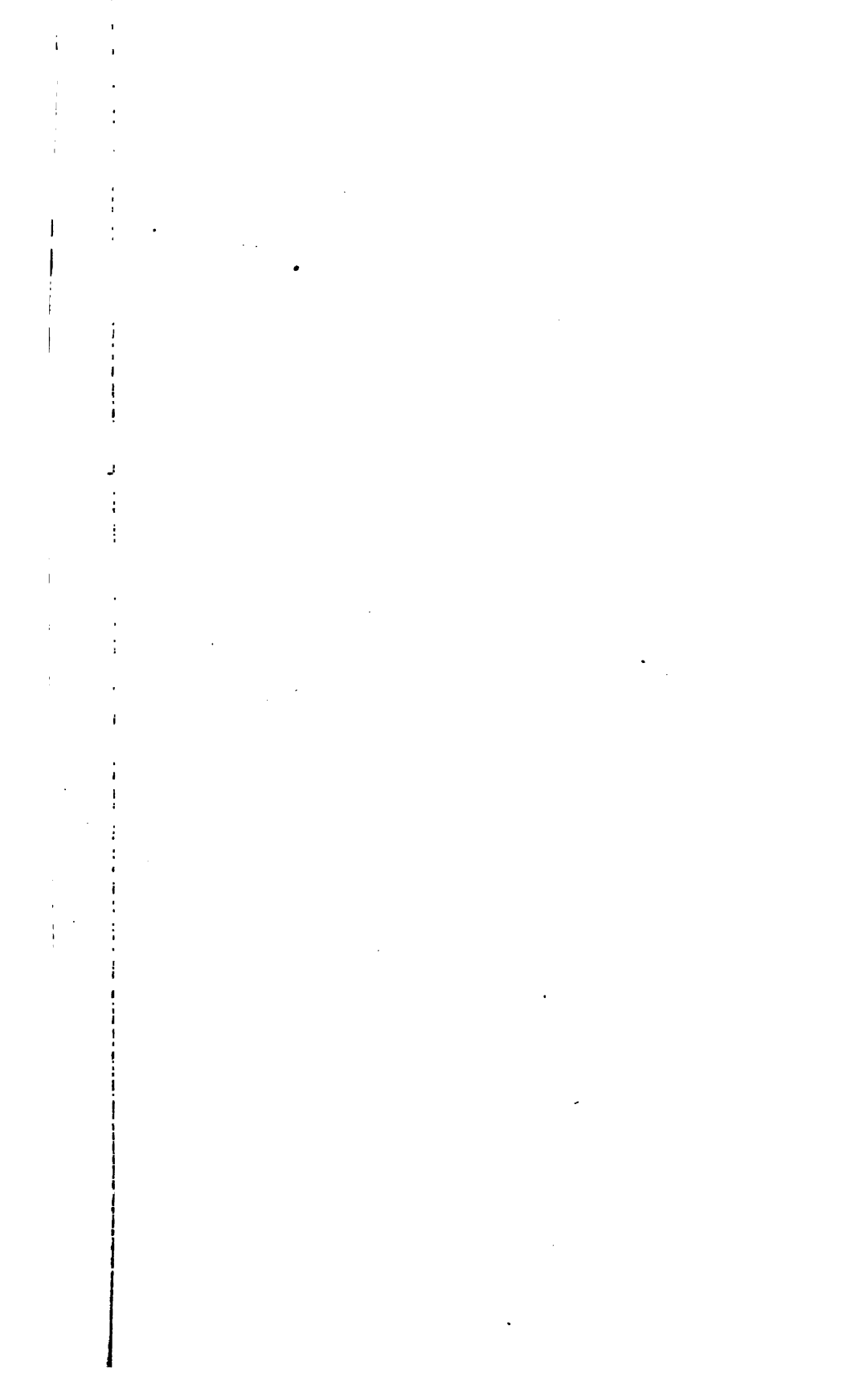


Table I.—Total of Deaths, Stillbirths and Deaths from Infectious Diseases for Thirty-eight Years.

YEARS.	Total Deaths, Exclusive of Stillbirths.	Stillbirths.	Rates of Still- births per 1,000 Inhabi- tants.	Diphtheria and Croup.	Scarlet Fever.	Typhoid Fever.	Cerebro-Spinal Meningitis.	Whooping Cough.	Measles.	Smallpox.	Pyæmia and Septicæmia.	Erysipelas.	Intermittent Fever.	Dysentery.
1871...	5,888	543	1.88	128	111	176	3	30	9	23	...	59	...	56
1872...	7,090	560	1.91	94	258	228	60	52	60	73	...	99	...	56
1873...	7,869	515	1.76	119	474	243	216	33	16	302	...	92	...	57
1874...	7,312	642	2.19	121	269	203	25	108	41	...	...	51	...	56
1875...	9,060	541	1.28	63	53	227	25	41	65	...	...	59	...	97
1876...	8,253	485	1.41	720	458	145	13	59	2	...	...	96	...	96
1877...	7,316	471	1.37	471	104	155	24	88	2	...	...	166	...	166
1878...	7,638	441	1.25	569	68	126	15	88	145	...	...	216	...	216
1879...	7,398	453	1.22	545	149	119	15	112	...	...	...	101	...	101
1880...	8,531	443	1.22	774	33	154	8	94	...	...	...	121	...	121
1881...	9,016	513	1.29	802	35	207	16	77	108	...	...	96	...	96
1882...	8,995	518	1.26	575	75	212	24	92	25	...	...	83	...	83
1883...	9,740	504	1.17	908	211	198	23	51	152	...	...	76	...	76
1884...	9,622	503	1.17	487	209	216	26	181	13	...	...	61	...	61
1885...	9,618	520	1.30	450	156	152	19	26	84	...	...	59	...	59
1886...	9,268	543	1.35	423	81	136	14	37	36	...	...	48	...	48
1887...	10,073	534	1.33	410	195	183	16	82	119	...	...	30	...	30
1888...	10,179	552	1.33	589	65	170	19	74	27	...	...	48	...	48
1889...	10,259	598	1.42	683	23	186	21	96	48	...	...	76	...	76
1890...	10,181	627	1.39	462	42	155	17	39	19	...	...	30	...	30
1891...	10,571	614	1.33	285	64	154	21	39	21	...	...	48	...	48
1892...	11,236	633	1.34	481	262	137	12	45	19	...	...	30	...	30
1893...	11,710	605	1.24	546	248	148	15	40	27	...	...	39	...	39
1894...	11,520	700	1.39	878	192	141	18	111	8	...	...	44	...	44
1895...	11,329	607	1.21	654	114	163	15	47	19	...	...	34	...	34
1896...	11,634	648	1.25	572	12	162	21	67	27	...	...	41	...	41
1897...	11,154	614	1.16	456	136	173	185	39	21	...	...	31	...	31
1898...	10,886	613	1.13	185	33	185	97	68	27	...	...	26	...	26
1899...	11,167	539	.97	304	74	165	88	76	33	...	...	28	...	28
1900...	11,678	573	1.02	537	181	143	66	99	89	...	...	36	...	36
1901...	11,300	576	1.01	353	210	142	54	65	103	...	...	22	...	22
1902...	10,983	623	1.08	225	87	139	62	132	66	...	...	15	...	15
1903...	10,632	633	1.09	214	65	119	47	108	50	...	...	20	...	20
1904...	10,757	663	1.13	206	39	135	37	29	89	...	...	15	...	15
1905...	11,007	670	1.13	132	44	117	142	29	54	...	...	26	...	26
1906...	11,411	658	1.09	152	39	122	83	112	61	...	...	20	...	20
1907...	11,686	732	1.20	144	49	64	169	43	29	...	...	14	...	14
1908...	11,776	636	1.03	204	104	159	53	82	151	...	...	...	...	...

Table II.—Total Number of Deaths under One Year; under Five Years, Five Years and Over, with Percentages to the Total Mortality for Thirty-seven Years. Also Death Rates under One Year per Ten Thousand Inhabitants.

YEARS.	Total Deaths.	Five Years and over.	Under Five Years.	Under One Year.	PERCENTAGES.			Death Rate under One Year per 10,000 Inhabitants.
					Five Years and over.	Under Five Years.	Under One Year.	
1872.	8,090	4,676	3,414	2,157	57.79	42.21	26.66	81.16
1873.	7,869	4,580	3,289	2,066	58.20	41.80	26.25	64.32
1874.	7,812	4,454	3,358	2,202	57.01	42.99	22.19	66.45
1875.	9,060	5,088	3,972	2,263	56.16	43.84	24.98	66.18
1876.	8,253	4,722	3,531	2,036	57.22	42.78	24.67	58.84
1877.	7,316	4,334	2,982	1,817	59.24	40.76	24.84	51.60
1878.	7,636	4,630	3,006	1,747	60.63	39.37	22.85	49.30
1879.	7,398	4,593	2,805	1,690	62.08	37.92	22.84	47.13
1880.	8,531	5,182	3,349	2,014	60.74	39.26	23.60	55.50
1881.	9,016	5,702	3,314	2,005	63.24	36.76	22.24	54.46
1882.	8,995	5,844	3,151	1,945	64.97	35.03	21.62	52.05
1883.	9,740	6,113	3,672	2,183	62.76	37.24	22.41	57.58
1884.	9,622	6,052	3,570	2,235	62.90	37.10	23.23	58.09
1885.	9,618	6,152	3,466	2,156	63.97	36.03	22.42	55.23
1886.	9,268	6,082	3,186	2,110	65.63	34.37	22.77	52.57
1887.	10,073	6,411	3,662	2,312	63.55	36.35	22.95	56.02
1888.	10,197	6,598	3,599	2,281	64.71	35.29	22.37	53.76
1889.	10,259	6,626	3,633	2,360	64.59	35.41	23.00	54.10
1890.	10,181	6,832	3,349	2,271	67.11	32.89	22.30	51.08
1891.	10,571	6,963	3,608	2,552	65.87	34.13	24.14	55.75
1892.	11,236	7,501	3,735	2,466	66.76	33.24	21.95	52.78
1893.	11,710	7,723	3,987	2,531	65.96	34.04	21.61	53.07
1894.	11,520	7,412	4,108	2,552	64.34	35.66	22.15	52.42
1895.	11,329	7,394	3,935	2,580	65.27	34.73	22.77	51.45
1896.	11,634	7,579	4,055	2,670	65.15	34.85	22.95	51.71
1897.	11,154	7,446	3,708	2,462	66.76	33.24	22.07	46.55
1898.	10,886	7,309	3,577	2,572	67.14	32.86	23.63	47.47
1899.	11,167	7,576	3,591	2,404	67.84	32.16	21.53	43.41
1900.	11,678	7,926	3,752	2,410	67.87	32.13	20.64	42.96
1901.	11,300	7,831	3,469	2,287	69.30	30.70	20.24	40.29
1902.	10,983	7,616	3,367	2,257	69.34	30.66	20.55	39.29
1903.	10,632	7,553	3,079	2,173	71.04	28.96	20.44	37.38
1904.	10,757	7,652	3,105	2,207	71.13	28.87	20.52	37.51
1905.	11,007	7,983	3,024	2,186	72.53	27.47	19.86	36.72
1906.	11,411	7,972	3,439	2,468	69.86	30.14	21.63	40.96
1907.	11,686	8,526	3,160	2,350	72.96	27.04	20.11	38.54
1908.	11,776	7,882	3,894	2,742	66.93	33.07	23.28	44.44

Table III.—Deaths during the Year 1908, by Sex, Condition, Color, Nativity, Parentage and Season.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Total number of deaths.....	1,048	977	1,072	1,045	1,072	799	962	1,051	954	915	861	1,020	11,776
<i>Sex:</i>													
Males.....	568	521	590	556	540	414	514	538	522	478	442	531	6,214
Females.....	480	456	482	489	532	385	448	513	432	437	419	489	5,562
<i>Condition:</i>													
Single.....	490	483	513	552	553	408	595	658	568	457	430	516	6,223
Married.....	345	313	327	310	335	236	219	225	233	280	268	319	3,410
Widowed.....	188	158	205	161	160	132	116	144	125	156	140	160	1,845
Divorced.....	7	6	2	.....	5	3	.....	5	7	2	4	6	47
Unknown.....	18	17	25	22	19	20	32	19	21	20	19	19	251
<i>Color:</i>													
White.....	1,017	947	1,041	1,019	1,034	775	942	1,023	928	888	836	989	11,439
Black (Negro or Mixed).....	27	30	29	25	34	24	20	25	25	27	22	28	316
Chinese.....	4	.....	2	1	.....	1	.....	3	1	.....	2	3	17
Japanese.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	2
East Indian.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Unknown.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
<i>Nativity:</i>													
United States..	660	615	676	675	670	499	663	752	652	577	564	638	7,641
Ireland.....	187	154	174	167	172	123	119	132	134	161	134	170	1,827
England.....	29	17	24	22	27	19	17	19	20	22	21	15	252
Scotland.....	5	5	10	1	7	4	5	3	3	9	8	4	64
Germany.....	20	21	15	11	13	19	23	16	23	13	21	20	215
British American.....	74	82	69	81	66	46	47	45	61	63	49	72	755
Italy.....	13	21	21	19	28	17	17	18	7	16	11	22	210
Russia.....	17	17	23	19	30	22	21	15	12	24	14	30	244
Sweden.....	1	9	5	7	9	9	7	3	4	4	6	6	70
Other countries	17	10	20	17	19	9	10	25	19	12	14	22	194
Unknown.....	25	26	35	26	31	32	33	23	19	14	19	21	304
<i>Parentage:</i>													
American.....	275	225	243	229	207	174	214	229	188	192	180	223	2,579
Irish.....	262	253	293	274	302	194	243	253	256	253	243	281	3,107
English.....	33	20	20	16	22	14	15	18	21	9	22	22	232
Scotch.....	9	6	20	5	10	10	12	3	7	15	10	7	114
German.....	23	26	24	19	18	22	30	19	28	17	24	20	270
British American.....	71	64	55	63	55	47	49	60	68	51	35	63	681
Italian.....	56	66	53	70	64	57	59	69	55	41	49	60	699
Russian.....	31	28	59	53	59	41	54	59	50	53	35	51	573
Swedish.....	3	10	3	8	13	11	9	8	7	6	8	6	92
Both parents foreign.....	62	69	64	77	68	37	48	79	53	45	53	63	718
One parent foreign.....	72	73	75	70	76	60	89	99	87	68	62	72	903
One parent unknown.....	65	60	69	82	74	50	60	80	57	78	67	66	808
Unknown.....	86	77	94	79	104	82	80	75	77	87	73	86	1,000

Table IV.—Death Rates and Birth Rates, 1890-1908.

YEAR.	Population.	Deaths.	Death Rate per 1,000.	Births.	Birth Rate per 1,000.
1890.....	*448,477	10,181	22.70	13,395	29.87
1891.....	457,772	10,571	23.09	14,491	31.66
1892.....	467,260	11,236	24.05	15,234	32.60
1893.....	476,945	11,710	24.55	14,801	31.03
1894.....	486,830	11,520	23.66	15,585	32.01
1895.....	†496,920	11,329	22.80	15,780	31.76
1896.....	516,305	11,634	22.53	16,547	32.05
1897.....	528,912	11,154	21.09	17,003	32.15
1898.....	541,827	10,886	20.09	16,702	30.83
1899.....	555,057	11,167	20.12	16,289	29.35
1900.....	*560,892	11,678	20.82	16,468	29.36
1901.....	567,617	11,300	19.91	16,010	28.21
1902.....	574,465	10,983	19.12	16,053	27.94
1903.....	581,357	10,632	18.29	16,042	27.59
1904.....	588,320	10,757	18.28	16,284	27.68
1905.....	†595,380	11,007	18.49	15,906	26.72
1906.....	602,526	11,411	18.94	17,225	28.59
1907.....	609,757	11,686	19.16	18,403	30.18
1908.....	617,075	11,776	19.08	18,347	29.73

* United States Census.

† State Census.

Table V.— Monthly Deaths Reduced to a Standard of 100.

MONTHS. 1908.	Total Deaths in Month.	Monthly Deaths Reduced to a Standard of 100.	Deaths per Day.
January.....	1,048	105.1	33.8
February.....	977	104.7	33.7
March.....	1,072	107.5	34.6
April.....	1,045	108.3	34.8
May.....	1,072	107.5	34.6
June.....	799	82.8	26.6
July.....	962	96.5	31.0
August.....	1,051	105.4	33.9
September.....	954	98.9	31.8
October.....	915	91.8	29.5
November.....	861	89.2	28.7
December.....	1,020	102.3	32.9
Total.....	11,776	100.0	32.2

Table VI.—Deaths from Principal Infectious Diseases.

	Total Deaths from each Cause.	Deaths per 1,000 Inhabitants.	Total Deaths by Sex.		Total Deaths by Sex under Five Years.		Total Deaths under Five Years.
			M.	F.	M.	F.	
Measles.....	151	.245	84	67	79	59	138
Scarlatina.....	104	.169	53	51	33	33	66
Diphtheria and Croup..	204	.331	106	98	64	62	126
Whooping-cough.....	82	.133	37	45	37	44	81
Typhoid Fever.....	159	.258	97	62	4	6	10
Erysipelas.....	48	.078	30	18	11	12	23
Puerperal Septicæmia..	25	.041	.....	25	.....	.....	.....
Dysentery.....	14	.023	4	10	1	2	3
Phthisis, Laryngeal, Pulmonary and General Tuberculosis.....	1,094	1.773	617	477	34	38	72
Influenza.....	59	.096	23	36	2	3	5
Syphilis, Congenital....	38	.062	20	18	20	18	38
Syphilis, Tertiary.....	9	.015	2	7	.....	.....	.....
Pyæmia and Septicæmia.	78	.126	42	36	7	6	13

Table VII.—Deaths from Ten of the Principal Causes.

	Total Deaths from each Cause.	Deaths per 1,000 Inhabitants.	Total Deaths by Sex.		Total Deaths by Sex under Five Years.		Total Deaths under Five Years.
			M.	F.	M.	F.	
Pneumonia.....	1,299	2.105	659	640	308	290	598
Heart Disease.....	1,177	1.907	584	593	11	12	23
Pulmonary, Laryngeal and General Tuberculosis.....	1,094	1.856	617	477	34	38	72
Violent Deaths.....	787	1.275	595	192	85	58	143
Diarrhoea and Enteritis.	779	1.262	403	376	376	311	687
Congenital Debility, etc.,	687	1.113	400	287	400	287	687
Cancer.....	628	1.018	236	392	2	4	6
Cerebral Hemorrhage and Congestion.....	557	.903	268	289	8	5	13
Nephritis.....	506	.820	256	250	12	11	23
Bronchitis.....	226	.366	109	117	63	50	113

Table VIII.—Total Deaths each Quarter of the last Five Years, with the Average Number from 1904 to 1908 Inclusive.

	1904.	1905.	1906.	1907.	1908.	5 years, 1904-1908, Average.
First quarter.....	2,963	2,907	2,993	3,162	3,097	3,024
Second quarter.....	2,598	2,677	2,797	2,840	2,916	2,766
Third quarter.....	2,625	2,821	2,834	2,711	2,967	2,792
Fourth quarter.....	2,571	2,602	2,787	2,973	2,796	2,746
Total each year.....	10,757	11,007	11,411	11,686	11,776	11,327

Table IX.—Total Deaths and Percentages each Quarter for the Year 1908 with Aggregates and Percentages for the Ten Years Previous.

	1908.		1898-1907.	
	Deaths.	Per cent.	Deaths.	Per cent.
First quarter.....	3,097	26.30	29,861	26.78
Second quarter.....	2,916	24.77	26,738	23.98
Third quarter.....	2,967	25.20	27,803	24.93
Fourth quarter.....	2,796	23.74	27,105	24.31
Total.....	11,776	100.00	111,507	100.00

Table X.—The Number and Percentages of Deaths in each Quarter of each Year during a Period of Forty-four Years, 1865-1908, Inclusive.

YEARS.	FIRST QUARTER.		SECOND QUARTER.		THIRD QUARTER.		FOURTH QUARTER.		Rate Per 1,000 Inhabitants.
	Deaths.	Per cent.	Deaths.	Per cent.	Deaths.	Per cent.	Deaths.	Per cent.	
1865.....	1,115	24.55	1,068	23.52	1,353	29.80	1,005	22.13	23.61
1866.....	999	22.81	957	21.85	1,338	30.56	1,085	24.78	22.51
1867.....	1,071	24.22	950	21.49	1,191	26.94	1,209	27.35	22.38
1868.....	1,341	24.30	1,203	21.80	1,736	31.45	1,239	22.45	23.89
1869.....	1,374	24.88	1,297	23.48	1,562	28.28	1,290	23.36	23.54
1870.....	1,395	22.88	1,314	21.55	1,983	32.52	1,406	23.05	24.34
1871.....	1,411	23.97	1,299	22.06	1,842	31.28	1,336	22.69	22.82
1872.....	1,697	20.97	1,777	21.97	2,511	31.04	2,105	26.02	30.43
1873.....	2,115	26.88	1,726	21.93	2,278	28.95	1,750	22.24	28.75
1874.....	1,805	23.11	1,818	23.27	2,278	29.16	1,911	24.46	23.57
1875.....	2,190	24.17	2,011	22.20	2,680	29.58	2,179	24.05	26.50
1876.....	2,246	27.21	1,809	21.92	2,375	28.78	1,823	22.09	20.86
1877.....	1,723	23.55	1,613	22.05	2,317	31.67	1,663	22.73	20.89
1878.....	1,743	22.82	1,744	22.84	2,174	28.47	1,975	25.87	21.55
1879.....	1,947	26.32	1,615	21.83	1,959	26.48	1,877	25.37	20.63
1880.....	2,015	23.62	1,829	21.45	2,500	29.30	2,187	25.63	23.51
1881.....	2,332	25.86	2,021	22.42	2,466	27.35	2,197	24.38	24.48
1882.....	2,104	23.39	2,212	24.59	2,489	27.67	2,190	24.35	24.07
1883.....	2,268	23.28	2,409	24.74	2,757	28.31	2,306	23.67	25.99
1884.....	2,284	23.73	2,103	21.85	2,725	28.33	2,510	26.09	25.01

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1885.....	2,510	26.10	2,484	25.82	2,592	26.95	2,032	21.13	24.64
1886.....	2,214	23.89	2,113	22.79	2,580	27.84	2,361	25.48	23.09
1887.....	2,362	23.45	2,281	22.65	2,912	28.90	2,518	25.00	21.41
1888.....	2,790	27.36	2,420	23.73	2,649	25.98	2,338	22.93	24.03
1889.....	2,437	23.75	2,543	24.78	2,854	27.82	2,425	23.64	23.52
1890.....	2,911	28.60	2,244	22.04	2,899	26.51	2,928	22.85	22.70
1891.....	2,442	23.10	2,540	24.03	2,835	26.82	2,754	26.05	23.09
1892.....	2,998	26.68	2,582	22.98	2,958	26.33	2,698	24.01	24.05
1893.....	2,969	25.35	2,847	24.31	3,013	25.74	2,881	24.60	24.55
1894.....	2,972	25.80	2,592	22.50	3,182	27.62	2,774	24.08	23.66
1895.....	2,995	26.44	2,574	22.72	3,027	26.72	2,733	24.12	22.80
1896.....	2,897	24.99	2,807	24.13	3,319	28.53	2,611	22.44	22.53
1897.....	3,022	27.09	2,802	25.12	2,833	25.40	2,497	22.39	21.09
1898.....	2,599	23.87	2,512	23.08	3,051	28.03	2,724	25.02	20.09
1899.....	2,987	26.75	2,632	23.57	2,800	25.07	2,748	24.61	20.12
1900.....	3,368	28.84	2,778	23.97	2,906	24.89	2,626	22.48	20.82
1901.....	3,032	26.83	2,744	24.29	2,814	24.90	2,710	23.98	19.91
1902.....	2,868	26.11	2,645	24.08	2,647	24.10	2,823	25.71	19.12
1903.....	2,982	28.05	2,515	23.65	2,594	24.40	2,541	23.90	18.29
1904.....	2,963	27.55	2,598	24.15	2,625	24.40	2,571	23.90	18.28
1905.....	2,907	26.41	2,677	24.32	2,821	25.63	2,602	23.64	18.49
1906.....	2,993	26.23	2,797	24.51	2,834	24.84	2,787	24.42	18.94
1907.....	3,162	27.06	2,840	24.30	2,711	23.20	2,973	25.44	19.16
1908.....	3,097	26.30	2,916	24.77	2,967	25.20	2,796	23.74	19.08

seases (Consumption Includ

PHOID FEVER.		MEAL	
Rate per 10,000 Living.		Deaths from.	Rate 10,000 Living.
		3	.
		1	.
		87	9.
		23	2.
		43	3.
		36	3.
		150	12.
		15	1.
		16	1.
		209	15.
		75	5.
		145	10.
		29	1.
		144	9.
		136	8.
		69	4.
4.27	4.80	77	4.
4.96		6	.
4.29		80	4.
4.25		15	.
6.18	5.83		
5.31		10	.
4.63		78	4.
6.97		7	.
5.65	5.26	46	2.
6.50		15	.
4.78		17	.
3.78		31	1.
5.19	5.26	68	2.
5.60		17	.
6.71		42	1.

Table XI.—Percentage of Children by Sex under One, Two and Five Years for each Month during the Year 1908.

Consumption Included), in One-

D. FEVER.		MEASLES.		
Deaths per 10,000 living.		Deaths from.	Rate per 10,000 Living.	
.82	7.09	9	.35	1.
.62		60	2.26	
.56		16	.50	
.10		41	1.24	
.64	3.92	65	1.90	1.
.19		2	.06	
.46		2	.06	
.39		145	4.09	
.32	5.19	2	.06	2.
.24		49	1.35	
.62		108	2.93	
.67		25	.67	
.22	3.91	152	4.00	1.
.61		13	.34	
.89		84	2.15	
.36		36	.90	
.43	3.11	119	2.88	1.
.01		27	.64	
.26		48	1.10	
.46		19	.42	
.36	3.06	21	.46	1.
.93		19	.41	
.10		27	.57	
.90		8	.16	
.28	2.44	19	.38	1.
.14		27	.52	
.27		21	.40	
.40		27	.50	
.97	2.45	33	.59	1.
.55		88	1.57	
.50		103	1.81	
.42		66	1.15	
.05	2.44	50	.86	1.
.29		89	1.51	
.96		53	.89	
.02		61	1.01	
.05	2.45	29	.47	1.
.58		151	2.45	

* Including croup since 1871.

Table XL—Percentage of Children by Sex under One Two and Five Years for each Month January 1890 to 1900

Table XII.—Cases Reported and Deaths from Smallpox, Diphtheria, Scarlet Fever, Typhoid Fever, Measles and Leprosy, with Percentages.

DATE.	SMALLPOX.			DIPHTHERIA AND CROUP.			SCARLET FEVER.			TYPHOID FEVER.			MEASLES.			LEPROSY.		
	Cases.	Deaths.	Percentages.	Cases.	Deaths.	Percentages.	Cases.	Deaths.	Percentages.	Cases.	Deaths.	Percentages.	Cases.	Deaths.	Percentages.	Cases.	Deaths.	Percentages.
1872.....	2,592	738	28.4	1,370	569	41.53	1,334	104	7.7									
1873.....	1,103	302	27.3	1,167	545	46.70	951	149	16.6									
1874.....	2	2	28.5															
1875.....	5	1	20.0															
1876.....	6	2	33.33															
1877.....	17	4	23.5															
1878.....																		
1879.....																		
1880.....	4	1	25.0	1,715	774	45.13	497	33	6.6									
1881.....	44		13.6	1,680	802	47.74	383	35	9.1									
1882.....	24		33.3	1,356	575	41.63	689	75	10.9									
1883.....	8		12.4	1,415	608	42.97	1,408	211	14.7									
1884.....	1	1	100.0	1,212	487	40.18	2,526	209	8.2									
1885.....	11	1	9.0	1,263	450	35.63	1,665	156	9.2									
1886.....	1			1,188	423	35.60	1,149	81	7.0									
1887.....	4			1,049	410	39.08	1,549	195	12.58									
1888.....	8	1	12.4	1,411	539	41.17	707	65	9.19									
1889.....	10	2	20.0	1,814	683	37.65	464	23	4.96									
1890.....	1			1,475	462	31.32	924	42	4.54									
1891.....				831	285	34.29	1,327	64	4.82									
1892.....				1,353	481	35.55	2,938	262	8.91									
1893.....	26	4	15.3	1,465	546	37.27	2,580	248	9.61									
1894.....	77	22	28.5	3,019	878	29.07	1,612	192	12.06									
1895.....				4,059	854	16.11	1,612	114	7.07									
1896.....				4,489	572	12.74	1,216	121	9.95									
1897.....	10			3,398	456	13.42	1,938	136	7.02									
1898.....				1,661	185	11.14	877	33	3.76									
1899.....	129	5	17.24	2,836	304	10.72	1,381	74	5.36									
1900.....	7			4,977	537	10.79	1,710	181	10.58									
1901.....	504	74	14.68	3,319	353	10.63	1,398	87	7.75									
1902.....	1,024	190	18.55	1,986	225	11.33	1,122	713	15.02									
1903.....	68	13	19.12	2,073	214	10.32	1,479	65	4.39									
1904.....				2,538	206	8.12	966	39	4.03									
1905.....	5	1	20.00	1,550	132	8.52	1,131	44	3.89									
1906.....	9			2,172	124	5.69	1,341	39	2.90									
1907.....	6			2,366	144	6.09	2,359	49	2.08									
1908.....				3,197	204	6.38	2,693	104	3.86									

* This percentage is not calculated, as the cases were only reported for a part of the year.

† Including one case and one death at Quarantine.

Table XIV.—Deaths of White and Colored, with Death Rates per 1,000 Inhabitants to Total Deaths, and Deaths from Pneumonia, Cancer, Heart Disease and Kidney Diseases with Death Rates per 10,000 Inhabitants, from 1840 to 1908 Inclusive.

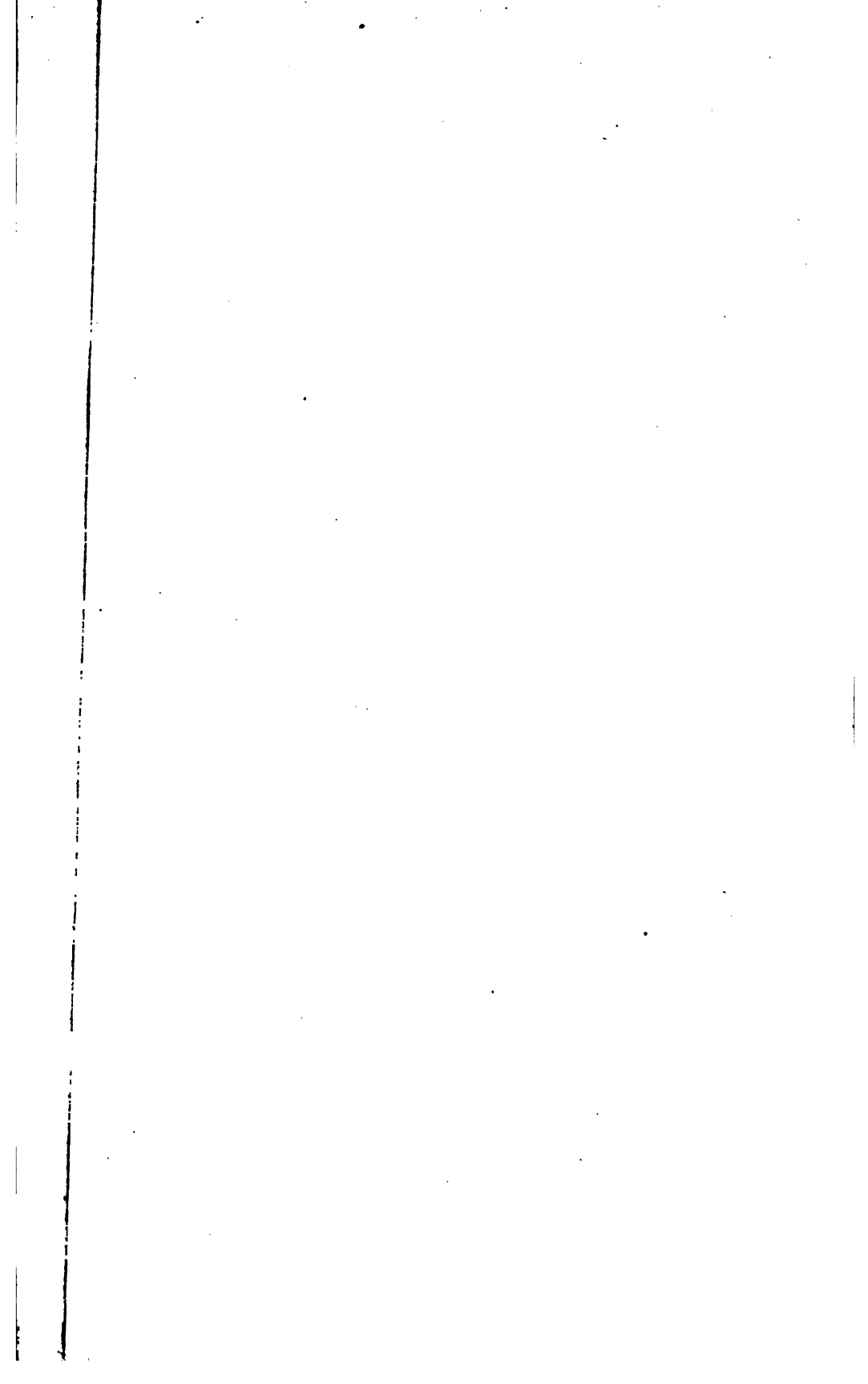
YEARS.	POPULATION.	DEATHS.			Death rate per 1,000 Inhabitants.	Deaths from Pneumonia.	Death rate per 10,000 Inhabitants.	Deaths from Cancer.	Death rate per 10,000 Inhabitants.	Deaths from Heart Disease.	Death rate per 10,000 Inhabitants.	Deaths from Kidney Diseases.	Death rate per 10,000 Inhabitants.
		White.	Colored.	Total.									
1840	84,311	.....	.....	1,972	23.39	135	16.01	17	2.02	15	1.78	.....	.....
1841	89,614	.....	.....	1,919	21.41	106	11.83	11	1.23	28	3.12	.....	.....
1842	95,251	.....	.....	2,426	25.47	181	19.00	10	1.05	42	4.40	.....	.....
1843	101,242	.....	.....	2,197	21.70	187	16.49	14	1.38	34	3.36	.....	.....
1844	107,610	.....	.....	2,241	20.82	132	12.26	27	2.50	35	3.53	.....	.....
1845	114,366	.....	.....	2,585	22.60	168	14.60	15	1.31	33	2.88	.....	.....
1846	118,551	.....	.....	3,398	28.59	234	19.74	19	1.60	42	3.54	.....	.....
1847	122,890	.....	.....	4,122	35.54	193	15.70	13	1.06	58	4.72	.....	.....
1848	127,387	.....	.....	3,972	31.18	190	14.91	22	1.73	62	4.87	.....	.....
1849	132,048	.....	.....	5,079	38.46	265	20.07	18	1.36	82	6.21	.....	.....
1850	136,831	.....	85	3,668	26.80	290	21.19	29	2.12	52	3.80	.....	.....
1851	141,308	.....	66	3,856	27.29	262	18.54	32	2.10	86	6.09	.....	.....
1852	145,878	.....	60	3,736	25.61	226	15.49	32	2.10	79	5.42	.....	.....
1853	150,595	.....	58	4,284	28.46	245	16.27	23	1.46	73	5.18	.....	.....
1854	155,464	.....	77	4,443	28.58	260	16.72	22	1.48	83	5.34	.....	.....
1855	160,494	.....	63	4,080	25.42	220	13.70	31	1.93	95	5.92	.....	.....
1856	163,826	.....	71	4,253	25.96	258	15.75	16	0.98	115	7.02	.....	.....
1857	167,218	.....	73	3,958	23.67	208	12.46	29	1.73	102	6.10	.....	.....
1858	170,685	.....	60	3,738	22.50	105	6.15	41	2.40	96	5.62	.....	.....
1859	174,227	.....	58	3,840	21.45	107	6.14	45	2.58	107	6.14	.....	.....
1860	177,840	.....	68	4,390	24.68	191	10.96	.....	.....	.....	.....	.....	.....
1861	180,640	.....	64	3,965	21.95	.....	.....	.....	.....	.....	.....	.....	.....
1862	183,497	.....	47	4,120	22.45	256	13.95	50	2.72	115	6.27	.....	.....
1863	186,390	.....	102	4,699	29.16	329	17.65	52	2.79	135	7.24	.....	.....
1864	189,331	.....	109	5,111	26.99	382	20.18	50	2.64	142	7.50	.....	.....
1865	192,318	.....	93	4,541	23.61	314	16.23	57	2.96	125	6.50	.....	.....
1866	194,506	.....	91	4,379	22.51	334	17.17	78	4.01	137	7.04	.....	.....

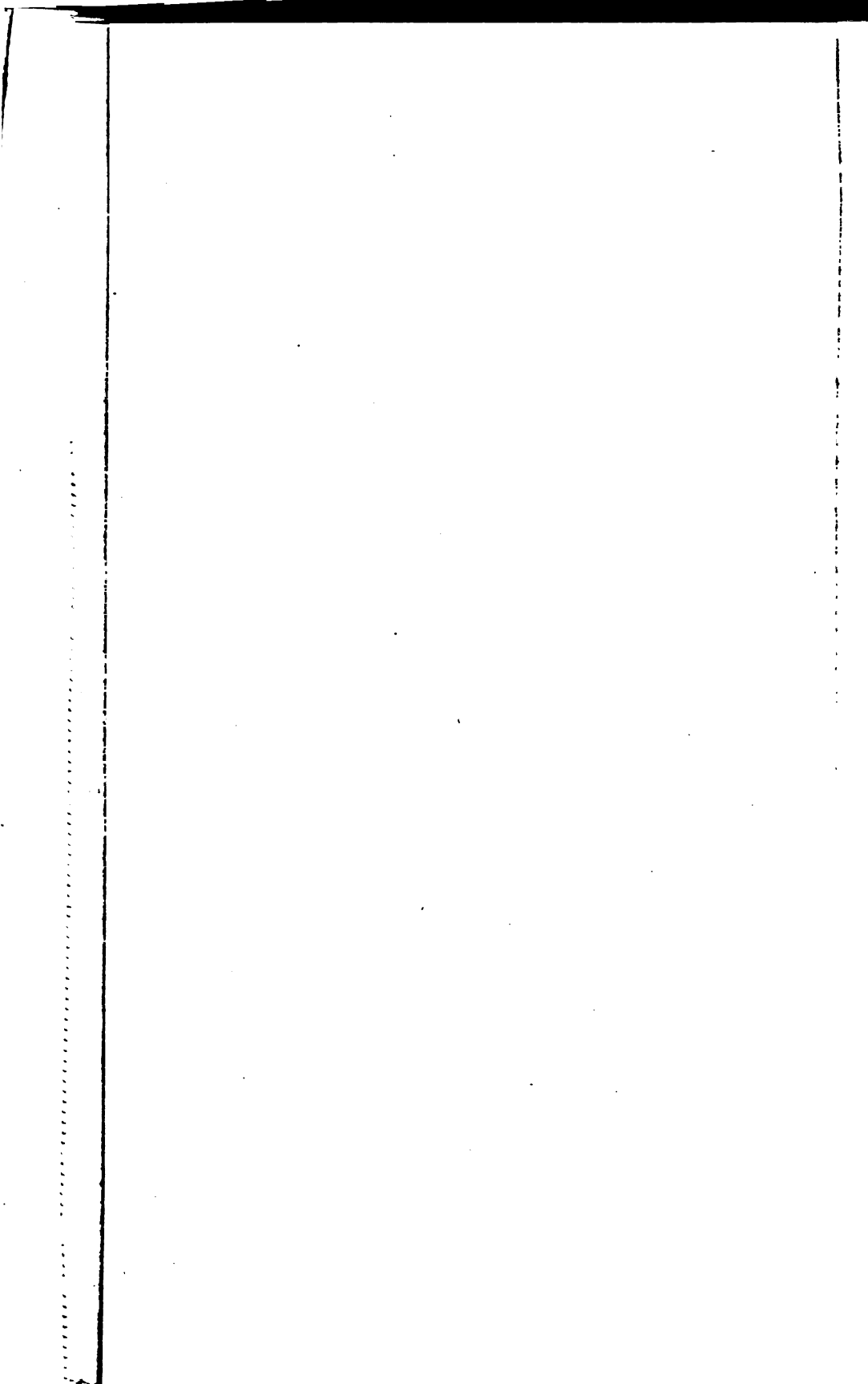
1867	227,523	4,313	108	4,421	19.43	227	9.98	82	3.60	139	6.11	61	2.68
1868	231,024	5,429	90	5,519	23.89	358	15.50	85	3.67	172	7.44	107	2.55
1869	246,541	5,377	146	5,523	22.40	402	16.30	107	4.34	159	6.44	182	4.34
1870	260,526	5,697	133	6,100	24.35	336	13.41	111	4.43	196	7.82	121	4.83
1871	286,032	5,762	126	5,888	22.82	527	20.42	102	3.95	239	9.62	142	5.60
1872	265,764	7,917	173	8,090	30.44	517	19.45	104	3.91	207	7.79	170	6.70
1873	321,200	7,624	245	7,869	24.50	463	14.41	141	4.39	144	4.48	149	4.64
1874	331,395	7,614	198	7,812	23.57	571	17.23	140	4.22	328	9.90	172	5.19
1875	341,919	8,901	159	9,060	26.50	632	18.48	103	3.01	322	9.42	142	4.15
1876	346,004	8,099	154	8,253	23.85	523	15.11	164	4.73	369	10.66	126	3.64
1877	350,138	7,142	174	7,316	20.89	484	13.82	190	5.43	285	8.14	176	5.02
1878	354,322	7,492	144	7,636	21.55	581	16.40	196	5.44	359	10.13	204	5.76
1879	358,554	7,202	196	7,398	20.63	613	17.10	195	5.44	383	10.68	298	5.52
1880	362,839	8,363	168	8,531	23.51	650	17.91	229	6.31	425	11.71	226	5.23
1881	368,190	8,782	234	9,016	23.49	684	18.58	241	6.55	465	12.63	259	7.03
1882	373,620	8,787	208	8,995	25.07	681	19.97	253	6.77	509	13.62	279	7.47
1883	379,129	9,513	227	9,740	25.69	757	19.86	293	7.73	528	13.93	280	7.39
1884	384,720	9,374	248	9,622	25.01	764	19.86	282	7.33	530	13.78	306	7.95
1885	390,393	9,366	232	9,618	24.64	963	24.67	274	7.02	563	14.42	343	8.79
1886	401,374	9,052	216	9,268	23.09	778	19.38	299	7.45	581	15.00	340	8.47
1887	412,663	9,824	249	10,073	24.41	795	19.26	324	7.85	619	15.47	331	8.02
1888	424,274	9,952	245	10,197	24.03	990	23.33	279	6.58	668	16.74	335	7.90
1889	436,208	10,019	240	10,259	23.52	934	21.41	306	7.01	789	18.09	319	7.31
1890	448,477	9,920	261	10,181	22.70	1,092	24.35	326	7.27	783	17.46	297	6.62
1891	457,772	10,301	270	10,571	23.09	1,149	25.10	317	6.92	764	16.69	324	7.08
1892	467,260	10,951	285	11,236	24.05	1,222	26.15	328	7.02	890	19.07	356	7.40
1893	476,945	11,427	283	11,710	24.55	1,540	32.29	320	6.50	785	16.46	376	7.88
1894	486,830	11,222	298	11,520	23.66	1,119	22.99	354	7.27	839	17.23	373	7.66
1895	496,920	11,034	295	11,329	22.80	1,268	25.30	391	7.90	870	17.36	377	7.52
1896	516,305	11,310	323	11,634	22.93	1,387	26.86	389	7.53	861	16.87	410	7.94
1897	528,912	10,862	322	11,154	21.09	1,236	23.36	400	7.56	913	17.26	409	7.73
1898	541,837	10,920	266	10,886	21.57	1,169	21.57	412	7.60	934	17.44	403	7.44
1899	555,057	10,858	309	11,167	20.12	1,455	26.21	402	7.24	966	17.40	428	7.71
1900	560,892	11,386	292	11,678	20.32	1,241	22.13	452	8.06	963	17.99	* 415	7.40
1901	574,465	11,008	292	11,300	19.91	1,099	19.36	455	8.82	1,009	16.97	528	9.30
1902	581,357	10,645	338	10,983	19.01	1,115	19.41	482	8.39	1,033	17.96	556	9.68
1903	588,320	10,469	297	10,632	18.29	1,265	21.76	511	8.81	992	17.06	563	9.83
1904	595,380	10,469	288	10,757	18.28	1,323	22.40	565	9.60	1,056	17.95	543	9.23
1905	602,526	11,097	257	11,007	18.49	1,274	21.40	628	10.55	1,082	18.17	568	9.54
1906	609,757	11,393	314	11,411	18.94	1,274	22.09	586	9.73	1,118	18.56	630	10.26
1907	617,075	11,439	293	11,686	19.16	1,233	20.22	611	10.02	1,211	19.86	627	10.48
1908			337	11,776	19.08	1,299	21.05	628	10.18	1,177	19.07	506	8.20

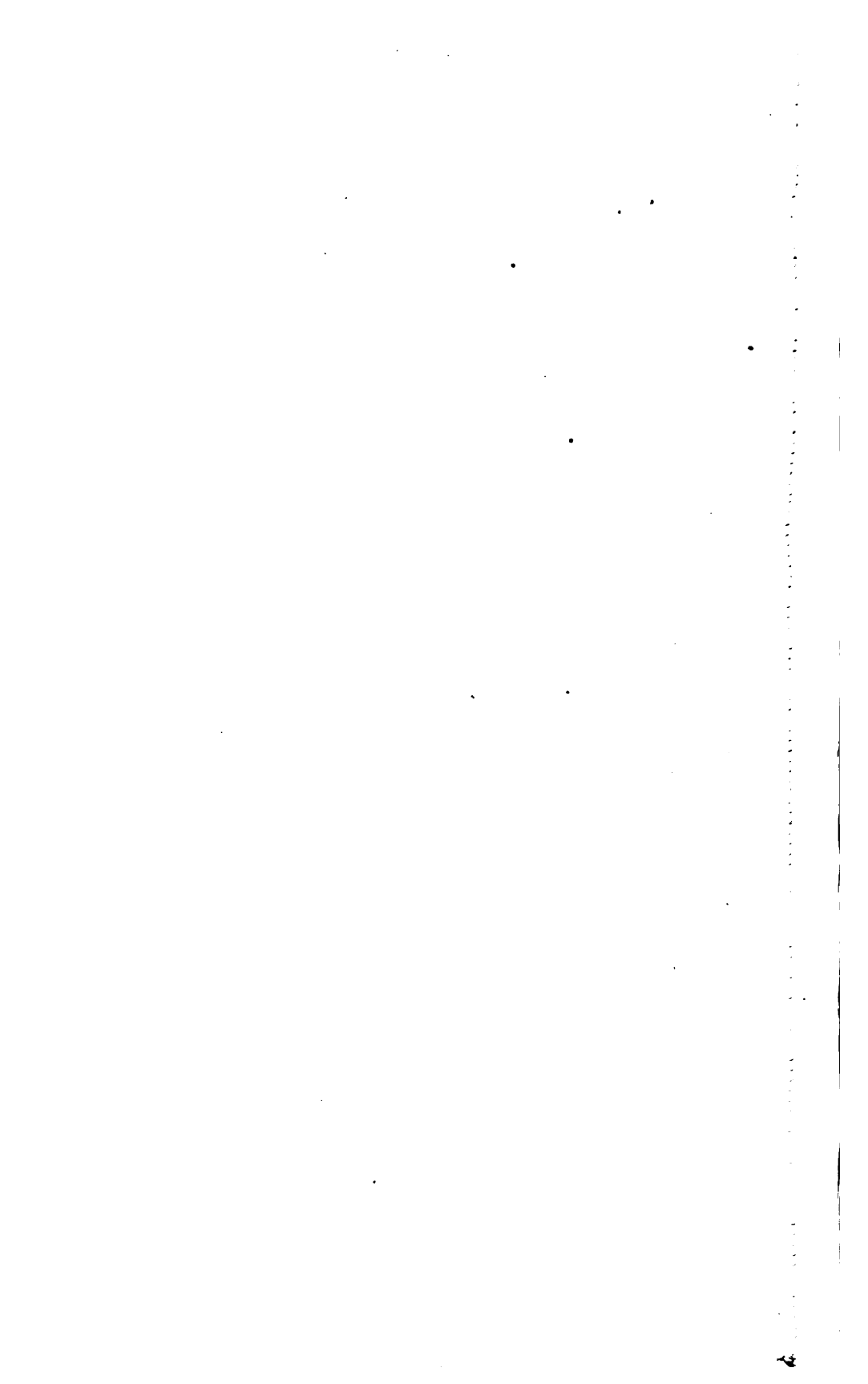
* Since 1900 Bright's disease and acute nephritis only are included.

Table XVI.—Stillbirths, by Months, with Ratio to Living Births and Ratio to 1,000 Inhabitants for Twenty Years.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Total Number of Living Births.	Number of Stillbirths to 100 Living Births.	Ratio to 1,000 Inhabitants.
1889.....	43	51	49	54	61	59	46	50	46	51	44	44	598	13,047	4.58	1.42
1890.....	55	40	52	58	46	42	51	49	54	50	68	56	627	13,395	4.68	1.36
1891.....	46	47	53	48	55	51	56	49	40	50	57	57	614	14,391	4.24	1.33
1892.....	54	46	52	57	60	53	51	55	44	53	57	54	633	15,334	4.16	1.34
1893.....	54	46	52	59	42	41	51	57	51	53	50	61	705	14,831	4.09	1.34
1894.....	56	56	60	50	69	53	53	65	52	72	65	44	701	15,585	4.46	1.39
1895.....	38	47	52	62	41	57	56	63	50	39	53	50	643	15,780	4.06	1.31
1896.....	59	53	61	48	62	51	51	62	58	52	58	48	614	17,003	3.55	1.25
1897.....	52	48	49	55	56	45	55	56	54	49	52	39	588	19,547	3.92	1.21
1898.....	50	68	49	61	56	52	55	53	54	53	46	37	613	16,702	3.61	1.16
1899.....	46	60	45	53	46	52	41	43	35	37	46	39	539	16,289	3.31	1.07
1900.....	51	56	63	43	46	52	41	49	42	57	41	47	573	16,468	3.46	1.02
1901.....	42	50	45	42	56	46	50	55	54	58	37	61	376	16,010	3.60	1.01
1902.....	51	50	45	66	37	59	39	66	55	42	50	63	623	16,053	3.86	1.06
1903.....	55	51	51	53	61	60	53	54	51	55	44	44	635	16,042	3.96	1.09
1904.....	57	53	62	50	66	60	52	65	54	49	46	49	663	16,284	4.07	1.13
1905.....	57	58	58	59	47	64	64	59	49	61	59	51	670	15,906	4.21	1.13
1906.....	42	56	51	50	61	61	71	54	43	62	49	42	668	17,225	3.82	1.09
1907.....	62	57	65	61	56	58	63	60	55	66	53	76	732	18,403	3.98	1.20
1908.....	39	49	53	57	50	64	48	62	46	50	66	52	636	18,347	3.47	1.03
Totals.....	1,012	1,019	1,069	1,086	1,066	1,101	1,018	1,076	973	1,043	1,043	1,058	12,504	319,612		
Average.....	51	51	53	54	53	55	51	54	49	52	52	53	628	15,981		









COMPARATIVE DEATHS IN AMERICAN AND FOREIGN CITIES.

The following tables have been prepared to show the comparison of deaths in a few large American and foreign cities. The Board of Health will be glad to be informed of any errors that may be discovered in any of the following tables:

Table XVII.—Boston.

YEARS.	Population.	Total Deaths (not includ- ing still- borns).	Population of Children un- der 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Group.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880.....	*362,839	8,531	*37,138	3,349	774	33	154	49
1881.....	368,190	9,016	36,800	3,314	802	35	207	108
1882.....	373,623	8,995	36,462	3,151	575	75	212	25
1883.....	379,129	9,740	36,124	3,627	608	211	198	152
1884.....	384,720	9,622	35,786	3,570	487	209	216	13
1885.....	*390,393	9,618	*35,449	3,466	450	156	152	84
1886.....	401,374	9,268	36,359	3,186	423	81	135	36
1887.....	412,663	10,073	37,269	3,662	410	195	183	119
1888.....	424,274	10,197	38,179	3,509	589	65	170	27
1889.....	436,208	10,259	39,090	3,633	683	23	186	48
1890.....	*448,477	10,181	*40,001	3,349	462	42	155	19
1891.....	457,772	10,571	41,358	3,608	285	64	154	21
1892.....	467,260	11,236	42,715	3,735	481	262	137	19
1893.....	476,945	11,710	44,072	3,987	546	248	148	27
1894.....	486,830	11,520	45,429	4,108	878	192	141	8
1895.....	*496,920	11,329	*46,787	3,935	654	114	163	19
1896.....	516,305	11,634	48,901	4,055	572	121	162	27
1897.....	528,912	11,154	51,016	3,708	456	136	173	21
1898.....	541,827	10,886	53,131	3,577	185	33	185	27
1899.....	555,057	11,167	55,246	3,591	304	74	165	33
1900.....	*560,892	11,678	*57,361	3,752	537	181	143	88
1901.....	567,617	11,300	56,320	3,469	353	210	142	103
1902.....	574,465	10,983	55,278	3,367	225	87	139	66
1903.....	581,357	10,632	54,236	3,079	214	65	119	50
1904.....	588,320	10,757	53,194	3,105	206	39	135	89
1905.....	*595,380	11,007	*52,152	3,024	132	44	117	54
1906.....	602,526	11,411	.....	3,439	152	39	122	61
1907.....	609,757	11,686	.....	3,160	144	49	64	29
1908.....	617,075	11,776	.....	3,894	204	104	159	151

* Census.

Table XVIII.—(Old City of) New York, N. Y.

YEARS.	Population.	Total Deaths (not including still-borns).	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880.....	1,209,196	31,937	140,673	14,650	2,300	618	372	479
1881.....	1,244,511	38,624	144,947	17,737	3,287	1,964	594	429
1882.....	1,280,857	37,924	149,351	17,520	2,254	2,066	516	913
1883.....	1,318,264	34,011	153,899	13,856	1,653	744	625	716
1884.....	1,356,764	35,034	158,565	15,272	1,838	608	476	762
1885.....	1,396,388	35,682	163,383	15,267	2,180	559	405	736
1886.....	1,437,170	37,351	168,347	16,121	2,695	371	433	668
1887.....	1,479,143	38,933	173,462	16,766	3,056	589	421	767
1888.....	1,522,341	40,175	178,733	17,358	2,553	1,361	364	591
1889.....	1,566,801	39,679	184,164	17,152	2,291	1,242	397	470
1890.....	1,612,559	40,103	189,760	16,305	1,783	408	352	730
1891.....	1,659,654	43,659	195,525	18,224	1,970	1,220	384	663
1892.....	1,708,124	44,329	.....	18,684	2,106	977	400	864
1893.....	1,758,010	44,486	.....	17,865	2,558	551	381	393
1894.....	1,809,353	41,175	.....	17,558	2,872	541	326	584
1895.....	1,873,201	43,420	210,523	18,221	1,976	468	322	793
1896.....	1,906,139	41,622	.....	16,807	1,763	402	297	714
1897.....	1,940,553	38,877	226,327	15,395	1,590	500	299	391
1898.....	1,976,572	40,438	233,150	15,591	923	523	376	446
1899.....	2,014,330	39,911	240,714	14,391	1,085	332	294	379
1900.....	2,055,714	43,227	233,537	15,648	1,276	315	372	470
1901.....	2,118,209	43,304	239,703	14,809	1,227	635	412	272
1902.....	2,182,836	41,704	245,202	15,017	1,142	635	399	462
1903.....	2,249,680	41,776	250,517	13,741	1,232	465	350	321
1904.....	2,318,831	48,743	256,137	16,136	1,272	534	309	556
1905.....	2,390,382	45,199	273,937	15,287	860	271	310	314
1906.....	2,464,432	46,108	282,424	15,534	1,183	212	369	662
1907.....	2,541,084	47,698	291,208	15,645	1,015	421	420	430
1908.....	2,620,447	44,061	300,303	14,910	1,097	801	291	642

Table XIX.—Philadelphia, Pa.

YEARS.	Population.	Total Deaths (not includ- ing still- borns).	Population of Children un- der 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880.....	846,980	17,711	* 91,544	6,594	626	291	498	108
1881.....	868,000	19,515	92,744	7,124	774	486	645	17
1882.....	886,539	20,059	94,044	7,254	1,399	310	650	91
1883.....	907,041	20,076	95,234	7,417	1,506	561	579	58
1884.....	927,995	19,999	96,465	7,606	1,269	540	662	96
1885.....	949,432	21,392	97,965	8,188	1,353	375	610	181
1886.....	971,363	20,005	98,925	7,351	1,061	248	618	19
1887.....	993,801	21,719	100,155	8,421	858	159	621	358
1888.....	1,016,758	20,372	101,386	7,269	623	235	785	24
1889.....	1,040,245	20,536	102,616	7,752	727	298	736	92
1890.....	1,046,964	21,732	*103,802	7,913	943	189	666	105
1891.....	1,069,264	23,367	105,077	8,479	1,362	341	683	27
1892.....	1,092,168	24,305	.....	9,198	1,707	485	440	74
1893.....	1,115,562	23,655	.....	8,690	1,159	267	456	88
1894.....	1,139,457	22,680	.....	8,431	1,396	153	370	132
1895.....	1,163,864	23,797	.....	8,401	1,349	79	469	84
1896.....	1,188,793	23,982	.....	8,661	1,155	61	402	191
1897.....	1,214,256	22,735	.....	7,605	1,474	282	401	64
1898.....	1,240,266	23,790	.....	7,998	1,154	114	639	234
1899.....	1,266,832	23,796	.....	7,056	994	132	948	7
1900.....	1,293,697	25,078	*131,131	8,078	1,042	163	449	382
1901.....	1,321,408	24,137	.....	6,840	643	220	444	26
1902.....	1,349,712	23,847	.....	6,922	515	143	588	112
1903.....	1,378,624	25,947	.....	7,078	608	189	957	141
1904.....	1,408,154	25,971	142,771	7,372	541	201	744	220
1905.....	1,438,318	24,807	145,845	6,978	452	59	684	53
1906.....	1,469,126	27,372	.....	8,525	546	56	1,063	344
1907.....	1,500,595	27,462	147,988	7,670	509	100	890	65
1908.....	1,532,738	26,304	.....	7,750	498	181	533	232

* Census year.

Table XX.—Chicago, Ill.

YEARS.	Population.	Total Deaths (not includ- ing still- borns).	Population of Children un- der 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1885.....	665,000	12,474	104,503	6,187	1,012	279	496	76
1886.....	704,000	13,699	.....	6,763	1,303	220	483	126
1887.....	760,000	15,409	.....	7,568	1,405	190	381	341
1888.....	830,000	15,772	.....	7,533	1,297	184	375	151
1889.....	965,000	16,946	.....	8,204	1,509	185	453	204
1890.....	1,099,850	21,869	140,783	9,954	1,261	193	1,008	67
1891.....	1,159,722	27,754	.....	12,801	1,358	499	1,997	265
1892.....	1,219,595	26,219	.....	11,662	1,548	382	1,489	185
1893.....	1,279,467	27,083	.....	12,202	1,467	329	670	234
1894.....	1,339,340	23,892	.....	11,016	1,406	190	492	182
1895.....	1,399,212	24,219	.....	10,452	1,632	77	518	156
1896.....	1,459,085	23,257	.....	9,718	1,098	54	751	73
1897.....	1,518,957	21,809	.....	8,456	774	81	437	139
1898.....	1,578,830	22,793	.....	8,135	680	67	636	55
1899.....	1,638,702	25,503	183,693	8,880	917	533	442	168
1900.....	1,698,575	24,941	190,355	8,283	840	226	337	194
1901.....	1,758,025	24,406	197,017	7,488	515	165	509	158
1902.....	1,820,000	26,455	203,913	8,027	627	445	801	123
1903.....	1,873,880	28,914	210,104	8,277	637	296	588	276
1904.....	1,932,315	26,311	204,246	7,072	409	143	373	47
1905.....	1,990,750	27,212	207,237	8,512	433	79	329	231
1906.....	2,049,185	29,048	210,041	8,792	554	493	370	128
1907.....	2,107,620	32,143	213,713	10,077	536	715	376	258
1908.....	2,166,055	30,548	218,555	9,676	568	398	338	174

Table XXI.—Brooklyn, N. Y.

YEARS.	Population.	Total Deaths (not includ- ing still- borns).	Population of Children un- der 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1885.....	665,234	15,369	75,512	6,756	832	363	153	175
1886.....	695,648	15,790	.....	7,000	1,185	340	123	106
1887.....	732,129	17,078	.....	7,577	1,453	271	143	172
1888.....	756,727	16,061	.....	8,019	1,285	475	153	59
1889.....	782,205	18,480	.....	8,265	1,467	273	161	205
1890.....	806,343	19,827	90,811	8,462	1,283	227	182	182
1891.....	833,133	21,349	118,300	9,388	1,180	485	180	203
1892.....	858,772	20,807	122,850	8,971	1,137	412	162	168
1893.....	885,201	21,017	.....	8,763	878	.....	179	111
1894.....	952,344	21,183	.....	9,235	1,660	188	159	204
1895.....	984,390	22,568	124,000	9,277	1,454	124	173	192
1896.....	1,023,769	22,501	.....	9,006	1,310	150	163	333
1897.....	1,058,478	20,674	130,500	8,252	998	187	173	190
1898.....	1,094,365	21,989	134,793	8,414	745	159	270	194
1899.....	1,131,467	21,649	.....	8,072	744	175	205	197
1900.....	1,166,582	23,507	135,638	8,776	863	130	301	310
1901.....	1,205,796	23,271	.....	8,151	732	495	272	162
1902.....	1,243,162	22,344	145,324	7,983	762	275	322	239
1903.....	1,281,686	22,192	.....	7,068	830	244	267	167
1904.....	1,321,403	24,831	155,254	8,042	706	282	303	333
1905.....	1,358,891	23,935	158,441	7,794	594	182	297	193
1906.....	1,404,569	25,024	163,351	8,547	793	258	230	446
1907.....	1,448,095	26,043	168,413	8,392	603	321	271	288
1908.....	1,492,970	23,938	173,632	7,626	549	477	206	307

Table XXII.—St. Louis.

YEARS.	Population.	Total Deaths (not including still- borns).	Population of Children un- der 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1885.....	400,000	7,490	45,067	3,090	501	164	125	54
1886.....	400,000	8,268	.....	3,434	879	149	124	6
1887.....	420,000	9,155	.....	3,795	1,112	48	116	40
1888.....	440,000	9,015	.....	3,659	731	30	130	31
1889.....	450,000	8,004	.....	3,149	439	114	146	63
1890.....	*451,770	8,409	50,395	3,115	244	87	140	1
1891.....	480,000	9,530	.....	3,493	340	96	165	53
1892.....	500,000	10,225	.....	3,607	286	150	441	7
1893.....	520,000	10,303	.....	3,548	371	79	215	26
1894.....	540,000	8,710	.....	3,192	379	29	171	3
1895.....	560,000	9,425	.....	3,373	683	18	107	38
1896.....	570,000	9,897	.....	3,326	273	11	108	17
1897.....	600,000	9,554	.....	2,799	240	19	123	1
1898.....	623,000	8,908	.....	3,358	303	28	95	21
1899.....	640,000	10,023	.....	3,005	192	34	131	15
1900.....	*575,238	9,849	57,023	2,648	408	57	148	45
1901.....	598,000	10,601	.....	2,748	259	69	176	34
1902.....	621,000	10,353	.....	2,671	160	132	222	10
1903.....	645,000	11,145	.....	2,842	162	89	288	140
1904.....	685,000	11,506	.....	2,443	136	64	225	33
1905.....	695,000	10,342	.....	2,196	111	13	122	52
1906.....	710,000	9,920	.....	2,304	105	18	111	10
1907.....	710,000	10,326	.....	2,409	83	24	102	77
1908.....	722,200	9,796	.....	2,224	128	36	94	7

* Census.

Table XXIII.—London, England.

YEARS.	Population.	Total Deaths (not includ- ing still- borns).	Population of Children un- der 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1885.....	4,083,928	80,316	.....	32,988	1,594	722	597	2,909
1886.....	4,149,533	82,545	.....	34,426	1,381	690	618	2,086
1887.....	4,215,192	82,304	.....	35,236	1,579	1,419	612	2,904
1888.....	4,282,921	79,099	.....	32,669	1,812	1,190	694	2,425
1889.....	4,351,738	76,026	.....	30,469	2,074	771	538	2,308
1890.....	4,180,021	87,689	.....	35,494	1,887	823	604	3,231
1891.....	*4,228,317	89,122	501,558	33,401	1,772	591	557	1,807
1892.....	4,264,076	86,833	.....	34,723	2,175	1,089	434	3,413
1893.....	4,306,411	89,707	.....	34,995	3,478	1,415	690	1,652
1894.....	4,349,166	75,635	.....	31,391	2,868	843	630	3,291
1895.....	4,381,119	85,601	.....	35,159	2,485	734	629	2,688
1896.....	*4,429,529	80,840	.....	35,106	2,800	843	574	3,662
1897.....	4,463,169	79,613	.....	32,228	2,348	703	579	1,907
1898.....	4,504,766	82,609	536,522	34,248	1,842	530	587	3,071
1899.....	4,546,752	88,063	541,523	33,020	2,040	361	801	2,132
1900.....	4,510,128	84,534	546,570	31,138	1,646	329	767	1,946
1901.....	*4,536,429	78,224	.....	29,125	1,332	511	528	1,967
1902.....	4,579,110	77,829	500,259	27,919	1,144	507	552	2,315
1903.....	4,613,812	70,281	504,050	25,713	749	321	363	2,056
1904.....	4,648,950	75,558	.....	27,902	728	307	283	2,278
1905.....	4,684,794	70,962	518,794	24,727	546	460	239	1,712
1906 ¹	4,721,217	73,990	515,784	25,300	726	533	275	1,918
1907 ¹	4,758,218	72,127	.....	22,839	812	645	203	1,801
1908 ²	4,795,757	70,380	525,348	21,505	750	548	243	1,539

* Census.

¹ Deaths for 52 weeks.² Deaths for 53 weeks.

NOTE.—For all deaths previous to 1906 the above table gives the corrected figures found in the Annual Reports of the Registrar General.

Table XXIV.—Paris, France.

YEARS.	Population.	Total Deaths (not including still- borns).	Population of Children under 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Group.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880.....	2,189,703	57,466	.....	17,970	2,153	356	2,120	986
1881.....	*2,239,928	57,066	148,601	17,448	2,326	447	2,121	925
1882.....	2,244,131	58,702	.....	17,411	2,390	158	3,352	1,018
1883.....	2,248,334	56,707	.....	17,147	1,953	90	2,046	1,067
1884.....	2,252,537	56,970	.....	17,305	2,091	160	1,619	1,533
1885.....	2,256,741	54,616	.....	15,566	1,786	198	1,412	1,564
1886.....	*2,260,945	57,092	146,177	16,914	1,661	416	1,035	1,255
1887.....	2,293,697	54,847	.....	15,617	1,769	232	1,496	1,674
1888.....	2,326,449	53,303	.....	14,909	1,953	206	847	958
1889.....	2,359,201	56,059	.....	15,047	1,890	173	1,114	1,220
1890.....	2,391,953	56,660	150,490	15,553	1,859	228	723	1,532
1891.....	*2,424,705	54,443	.....	14,048	1,531	208	549	1,020
1892.....	2,442,089	57,137	.....	14,800	1,557	164	799	919
1893.....	2,459,474	55,469	.....	13,555	1,465	182	649	701
1894.....	2,476,859	51,653	.....	12,385	1,176	164	773	1,020
1895.....	2,494,244	54,266	.....	12,923	517	188	314	712
1896.....	*2,511,629	50,509	.....	10,835	527	178	291	695
1897.....	2,541,415	49,781	156,494	11,052	354	69	277	849
1898.....	2,571,201	52,567	.....	12,286	312	147	306	912
1899.....	2,600,987	53,932	.....	11,433	390	227	899	975
1900.....	2,630,773	55,392	.....	11,235	346	197	1,013	908
1901.....	*2,660,559	53,449	*170,694	11,024	874	133	421	561
1902.....	2,672,993	53,173	.....	11,234	866	154	420	751
1903.....	2,685,427	50,792	.....	9,711	483	173	369	489
1904.....	2,697,861	51,968	.....	10,219	334	80	414	651
1905.....	2,710,295	52,206	.....	9,605	251	48	303	477
1906.....	*2,722,731	52,483	.....	9,520	214	97	368	647
1907.....	2,735,165	.....	.....	.....	.....	.....	.....	.....
1908.....	2,747,599	.....	.....	.....	.....	.....	.....	.....

* Census.

Table XXV. — Vienna, Austria.

YEARS.	Population.	Total Deaths (not includ- ing still- borns).	Population of Children un- der 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880.....	721,016	20,453	58,023	8,219	597	172	171	98
1881.....	741,208	21,549	.....	8,224	539	286	171	106
1882.....	749,919	21,595	.....	8,903	522	410	187	203
1883.....	750,762	21,194	.....	7,930	360	150	157	246
1884.....	759,849	20,353	.....	7,688	342	130	95	344
1885.....	769,889	21,976	.....	8,668	464	83	106	289
1886.....	780,066	20,869	.....	8,114	546	124	85	338
1887.....	790,381	20,549	.....	7,912	455	391	80	493
1888.....	800,836	20,349	.....	7,547	521	230	107	253
1889.....	811,434	20,106	.....	7,624	513	139	103	364
1890.....	822,176	20,324	69,710	7,853	536	92	77	459
1891.....	1,378,530	34,479	130,808	15,610	1,311	271	85	855
1892.....	1,406,933	35,134	.....	15,834	1,580	242	116	825
1893.....	1,435,931	34,515	.....	15,002	1,615	311	105	1,225
1894.....	1,465,637	33,994	140,545	15,073	1,679	413	74	898
1895.....	1,495,764	34,879	.....	15,021	710	437	86	754
1896.....	1,526,623	34,132	.....	14,684	621	436	79	930
1897.....	1,551,129	33,187	.....	13,946	575	236	84	857
1898.....	1,590,295	32,356	.....	13,593	520	227	93	794
1899.....	1,623,134	33,952	.....	13,599	489	266	67	725
1900.....	1,656,662	34,303	160,233	13,650	306	168	137	741
1901.....	1,691,996	33,502	.....	12,476	387	367	76	634
1902.....	1,726,604	33,857	.....	13,399	438	277	51	769
1903.....	1,744,177	32,818	.....	12,171	424	117	69	383
1904.....	1,797,992	32,931	.....	12,270	386	65	60	1,021
1905.....	1,897,630	36,671	213,884	13,282	449	180	84	585
1906.....	1,937,869	33,973	.....	12,023	456	256	95	594
1907.....	1,979,003	34,188	.....	11,123	340	233	52	605
1908.....	2,021,052	35,511	.....	11,970	339	261	86	928

Table XXVI.—Glasgow, Scotland.

YEARS.	Population.	Total Deaths (not including still- borns).	Population of Children under 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1885		13,486		6,134	228	297	113	439
1886		13,104		5,589	211	359	89	91
1887		12,135		5,354	292	235	104	298
1888		11,681		4,751	275	170	68	211
1889		13,139		5,990	300	112	128	641
1890		13,374		5,771	204	127	119	640
1891	*659,193	14,324	72,481	5,430	195	210	143	439
1892	669,059	15,218	84,860	6,306	249	304	102	781
1893	677,883	15,797	85,968	6,946	305	261	120	865
1894	686,820	13,673	87,103	5,337	320	205	150	243
1895	695,876	16,344	88,250	6,458	185	180	121	331
1896	705,052	14,385	89,413	6,152	137	139	139	817
1897	714,919	15,726	90,665	6,748	144	133	169	575
1898	724,349	15,328	91,861	6,527	132	187	222	538
1899	733,903	15,827	93,073	6,196	123	202	178	548
1900	755,730	16,392		6,531	149	210	157	264
1901	*761,709	16,190		6,453	122	134	183	497
1902	775,601	15,530		5,426	105	109	104	265
1903	786,897	15,071		5,889	114	79	144	348
1904	798,357	15,413	95,164	5,993	106	70	82	331
1905	809,986	14,456		5,591	120	36	58	568
1906	835,625	14,889	100,091	5,447	147	48	90	394
1907	847,584	15,659	101,524	5,806	131	45	99	399
1908	859,715	15,265	102,977	6,012	156	90	72	830

* Census.

Table XXVII. — Liverpool, England.

YEARS	Population.	Total Deaths (not including still- borns).	Population of Children under 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1884.....	541,031	14,382		6,908		197	112	611
1885.....	537,548	13,764		6,213		190	95	716
1886.....	534,088	13,919		6,152		277	140	273
1887.....	530,649	14,006		6,218		321	130	661
1888.....	527,233	12,159		5,070		187	125	331
1889.....	523,838	13,047		5,921		352	167	485
1890.....	520,466	14,293		6,319		577	99	535
1891.....	518,302	13,911		5,697	119	119	92	320
1892.....	519,590	12,671		5,322	109	131	111	456
1893.....	520,882	13,919		6,035	85	231	221	273
1894.....	522,178	12,073	64,544	5,214	127	232	248	299
1895.....	652,523	16,624	78,411	7,233	170	169	197	398
1896.....	658,050	14,476		6,064	202	217	166	312
1897.....	663,633	15,590		6,972	149	209	145	344
1898.....	669,243	15,380		6,489	164	145	148	283
1899.....	674,912	16,861	83,042	7,090	242	164	182	321
1900.....	680,628	16,393		6,417	183	113	120	150
1901.....	686,322	15,497	85,238	6,474	209	195	154	473
1902.....	710,337	15,994	85,885	6,377	241	318	190	334
1903.....	716,810	14,900		5,786	177	201	108	132
1904.....	723,430	16,524	88,475	7,826	214	149	82	696
1905.....	733,714	14,849	89,296	5,812	175	303	49	247
1906.....	739,180	15,745	90,382	6,786	153	193	85	586
1907.....	746,144	14,408	91,250	5,398	109	140	92	291
1908.....	753,203	14,663	92,022	5,568	136	217	73	259

Table XXVIII. — Berlin, Germany.

YEARS.	Population.	Total Deaths (not including still- borns).	Population of Children under 5 years of age.	Deaths of Chil- dren under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1885.....	1,315,665	31,483	146,227	16,828	2,007	409	250	406
1886.....	1,363,220	34,293	.....	19,215	1,688	271	232	565
1887.....	1,414,969	30,333	.....	15,777	1,404	257	230	223
1888.....	1,471,972	29,294	.....	15,076	1,100	201	235	364
1889.....	1,528,681	34,460	.....	18,394	.....	243	335	201
1890.....	1,578,516	33,393	164,370	17,630	1,586	298	177	471
1891.....	1,606,617	33,392	.....	16,800	1,078	150	196	173
1892.....	1,622,477	32,696	172,378	16,319	1,405	314	170	305
1893.....	1,640,994	36,034	.....	18,038	1,543	582	198	341
1894.....	1,656,074	30,961	176,200	14,649	1,431	443	94	344
1895.....	1,678,924	33,627	.....	16,024	999	817	127	320
1896.....	1,721,855	30,578	.....	13,443	569	388	111	219
1897.....	1,756,398	30,622	.....	13,823	547	217	90	308
1898.....	1,803,211	30,574	.....	13,595	664	268	98	264
1899.....	1,846,217	34,011	.....	14,878	655	651	98	530
1900.....	1,888,313	35,411	177,790	15,499	563	613	127	514
1901.....	1,893,941	34,096	.....	14,844	513	492	114	442
1902.....	1,911,628	30,740	.....	11,728	226	272	62	373
1903.....	1,946,076	31,882	.....	12,255	246	331	80	341
1904.....	1,988,742	33,425	.....	12,793	357	425	79	420
1905.....	2,043,313	34,451	178,567	13,239	310	428	110	418
1906.....	2,064,677	32,648	183,441	11,820	355	285	97	511
1907.....	2,096,318	32,353	184,950	10,834	469	179	79	393
1908.....	2,102,727	.....	18,4907	10,748	559	276	75	290

DEATH RATES BASED UPON THE PRECEDING TABLES.

Table XXIX.—Death Rates per 1,000 of Population.

YEARS	Boston, Mass.	New York, N. Y. (old city).	Philadelphia, Pa.	Chicago, Ill.	Brooklyn, N. Y.	St. Louis, Mo.	London, England.	Paris, France.	Vienna, Austria.	Glasgow, Scotland.	Liverpool, England.	Berlin, Germany.
1899.....	20.12	19.81	18.78	15.56	19.13	15.30	19.37	20.74	20.92	21.57	24.11	18.42
1900.....	20.82	21.03	19.38	14.68	20.15	17.12	18.74	21.06	20.71	21.69	23.19	18.75
1901.....	19.91	20.44	18.27	13.88	19.30	17.73	17.24	20.09	19.80	21.26	21.68	18.00
1902.....	19.12	19.11	17.67	14.54	17.97	16.67	17.00	19.89	19.61	20.02	21.67	16.08
1903.....	18.29	18.57	18.82	15.43	17.32	17.28	15.23	18.91	18.82	19.15	19.87	16.38
1904.....	18.28	21.02	18.44	13.62	18.79	16.80	16.25	19.26	18.32	19.31	21.91	16.81
1905.....	18.49	18.91	17.25	13.67	17.61	14.88	15.15	19.26	19.32	17.85	19.22	16.86
1906.....	18.94	18.71	18.63	14.18	17.82	13.97	15.67	19.28	17.53	17.82	20.29	15.81
1907.....	19.16	18.77	18.30	15.25	17.98	14.54	15.16	.....	17.27	18.47	18.33	55.43
1908.....	19.08	16.81	17.16	14.10	16.03	13.56	14.68	.....	17.57	17.76	19.47	.....

Table XXX.—Birth Rates per 1,000 of Population.

YEARS.	Boston, Mass.	New York, N. Y. (old city).	Philadelphia, Pa.	Chicago, Ill. *	Brooklyn, N. Y.	St. Louis, Mo.	London,†	Paris, France.	Vienna, Austria.	Glasgow, Scotland.	Liverpool,†	Berlin, Germany.
1899.....	29.4	25.9	22.5	.....	18.7	16.3	29.4	20.6	31.2	33.0	35.6	27.0
1900.....	29.4	26.6	22.5	.....	19.3	18.7	28.6	21.0	30.9	32.7	36.0	26.7
1901.....	28.2	25.5	21.4	.....	18.4.	17.9	29.0	21.3	29.9	31.7	32.1	26.7
1902.....	27.9	26.4	22.1	.....	18.9	19.2	28.5	20.8	30.2	31.9	34.2	25.8
1903.....	27.6	27.6	22.5	.....	21.3	18.4	28.4	19.9	26.2	31.9	33.4	24.7
1904.....	27.7	28.1	22.8	13.8	21.9	17.5	27.9	19.6	28.3	31.0	33.7	24.5
1905.....	26.7	28.0	23.1	12.9	22.7	17.5	27.1	18.8	25.8	30.0	33.3	24.4
1906.....	28.6	28.5	23.5	12.3	24.6	19.0	26.7	18.8	26.2	29.4	32.7	24.9
1907.....	30.2	30.3	23.1	12.2	26.7	20.5	25.8	20.3	24.8	28.3	31.8	24.1
1908.....	29.7	29.2	.....	.....	28.1	21.9	25.4	.....	23.4	27.8	†31.7	.....

* Only about one-half the births are recorded.

† Fifty-two weeks.

‡ Entire year.

Table XXXI.—Deaths of Children under Five Years per 1,000 of Population.

YEARS.	Boston, Mass.	New York, N. Y. (old city).	Philadelphia, Pa.	Chicago, Ill.	Brooklyn, N. Y.	St. Louis, Mo.	London, England.	Paris, France.	Vienna, Austria.	Glasgow, Scotland.	Liverpool, England.	Berlin, Germany.
1899.....	6.47	7.14	5.57	5.42	7.13	4.70	7.26	4.40	8.38	8.44	10.50	8.06
1900.....	6.69	7.61	6.24	4.88	7.52	4.60	6.90	4.27	8.24	8.64	9.43	8.21
1901.....	6.11	6.99	5.18	4.26	6.76	4.60	6.42	4.14	5.86	8.47	9.43	7.84
1902.....	5.86	6.88	5.13	4.41	6.42	4.30	6.10	4.20	7.76	7.00	8.98	6.14
1903.....	5.30	6.11	5.13	4.42	5.52	4.41	5.57	3.62	6.98	7.48	8.07	6.30
1904.....	5.28	6.96	5.24	3.66	6.09	3.57	6.00	3.79	6.82	7.51	10.82	6.43
1905.....	5.08	6.40	4.85	4.28	5.74	3.16	5.28	3.54	7.00	6.90	7.92	6.48
1906.....	5.71	6.30	5.80	4.29	6.09	3.25	5.36	3.50	6.20	6.52	9.18	5.65
1907.....	5.18	6.16	5.11	4.78	5.80	3.39	4.80	.....	5.62	6.85	7.23	5.17
1908.....	6.31	5.69	5.06	4.47	5.11	3.08	4.48	.....	5.92	6.99	7.39	5.11

Table XXXII.—Number of Deaths from Diphtheria and Croup per 100,000 of Population.

YEARS.	Boston, Mass.	New York, N. Y. (old city).	Philadelphia, Pa.	Chicago, Ill.	Brooklyn, N. Y.	St. Louis, Mo.	London, England.	Paris, France.	Vienna, Austria.	Glasgow, Scotland.	Liverpool, England.	Berlin, Germany.
1899.....	54.77	53.86	78.46	55.96	65.76	30.00	44.87	14.99	30.13	16.76	35.85	35.48
1900.....	95.74	62.07	80.55	49.45	73.98	70.93	36.50	13.15	18.47	19.72	26.89	26.82
1901.....	62.19	57.93	48.66	29.29	60.71	43.31	29.36	32.85	22.87	16.02	30.45	27.09
1902.....	39.17	52.32	38.16	34.45	61.29	25.77	24.98	32.40	25.37	13.54	33.93	11.82
1903.....	36.81	54.76	44.10	33.99	64.76	25.12	16.23	17.99	24.31	14.49	24.69	12.64
1904.....	35.02	54.86	38.42	21.17	53.43	19.85	15.66	12.38	21.47	13.28	29.58	17.95
1905.....	22.17	35.98	31.43	21.75	43.71	15.97	11.65	9.26	23.66	14.81	23.85	15.17
1906.....	25.23	48.00	37.16	27.04	56.46	14.79	15.38	7.86	23.53	17.59	20.70	16.98
1907.....	23.62	39.94	33.92	25.43	41.64	11.69	17.07	.....	17.18	15.46	14.61	22.37
1908.....	33.06	41.86	32.49	26.22	36.77	17.72	15.64	.....	16.77	18.15	18.06	26.58

Table XXXIII.—Number of Deaths from Scarlet Fever per 100,000 of Population.

YEARS.	Boston, Mass.	New York, N. Y. (old city).	Philadelphia, Pa.	Chicago, Ill.	Brooklyn, N. Y.	St. Louis, Mo.	London, England.	Paris, France.	Vienna, Austria.	Glasgow, Scotland.	Liverpool, England.	Berlin, Germany.
1899.....	13.33	16.48	10.42	32.53	15.47	5.31	7.94	8.73	10.39	27.52	24.30	35.26
1900.....	32.27	15.32	12.60	13.31	11.14	9.91	7.29	7.49	10.14	27.79	16.60	32.46
1901.....	37.00	29.98	16.65	9.39	41.05	11.54	11.26	5.00	21.69	17.59	28.41	25.98
1902.....	15.14	29.09	10.59	24.45	22.12	21.26	11.07	5.76	16.04	14.05	44.77	14.23
1903.....	11.18	20.67	13.71	15.80	19.04	13.80	6.96	6.44	6.71	10.04	28.04	17.01
1904.....	6.63	23.03	14.27	7.40	21.34	9.34	6.60	2.97	3.62	8.77	20.60	21.37
1905.....	7.39	11.34	4.10	3.97	13.39	1.87	9.81	1.77	9.49	4.45	41.30	20.95
1906.....	6.47	8.60	3.81	24.06	18.37	2.54	11.29	3.56	13.21	5.74	26.11	13.63
1907.....	8.04	16.57	6.66	33.93	22.17	3.38	13.56	.....	11.77	5.31	18.76	8.54
1908.....	16.85	30.57	11.81	18.37	31.95	4.99	11.43	.....	12.91	10.47	28.81	13.13

Table XXXIV.—Number of Deaths from Typhoid Fever per 100,000 of Population.

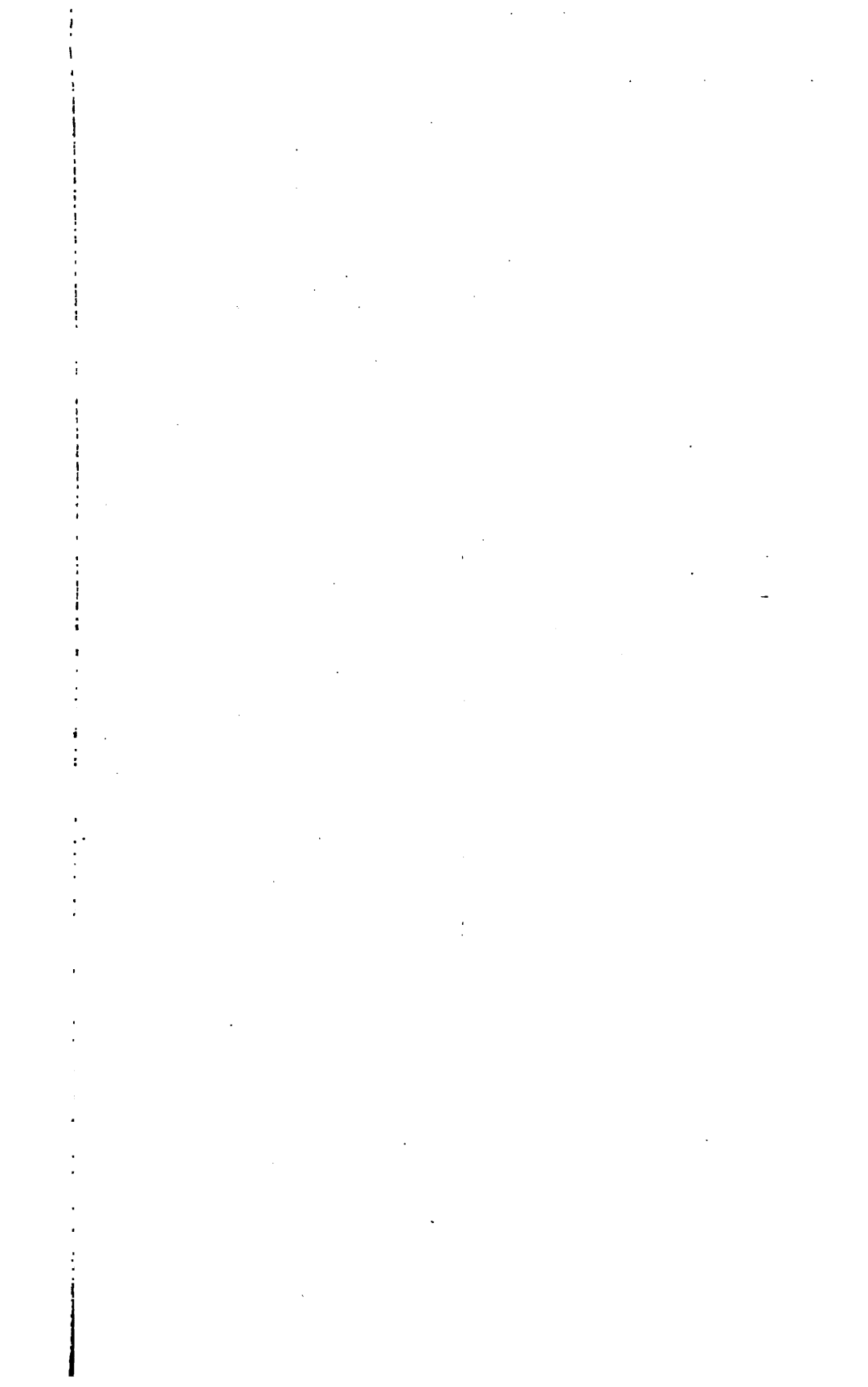
YEARS.	Boston, Mass.	New York, N. Y. (old city).	Philadelphia, Pa.	Chicago, Ill.	Brooklyn, N. Y.	St. Louis, Mo.	London, England.	Paris, France.	Vienna, Austria.	Glasgow, Scotland.	Liverpool, England.	Berlin, Germany.
1899.....	29.73	14.60	74.83	26.97	18.12	20.47	17.62	34.56	4.13	24.25	26.96	5.31
1900.....	25.50	18.10	34.71	19.84	25.80	25.73	17.01	38.51	8.27	20.77	17.63	6.73
1901.....	25.02	19.45	33.60	28.95	22.56	29.43	11.64	15.82	4.49	24.03	22.44	6.02
1902.....	24.20	18.28	43.57	44.01	25.90	35.75	12.05	15.71	2.95	13.41	26.75	3.24
1903.....	20.47	15.56	55.14	31.38	20.83	44.65	7.87	13.74	3.96	18.30	15.07	4.11
1904.....	22.95	13.33	52.84	19.30	22.93	32.85	6.09	15.35	3.34	10.27	11.33	3.97
1905.....	19.65	12.97	47.56	16.53	21.86	17.55	5.10	11.18	4.43	7.16	6.68	5.38
1906.....	20.25	14.97	72.36	18.06	16.38	15.63	5.83	13.52	4.90	10.77	11.50	4.64
1907.....	10.50	16.53	59.31	17.84	18.71	14.70	4.27	.....	2.63	11.68	12.33	3.77
1908.....	25.77	11.10	34.77	15.60	13.80	13.02	5.07	.....	4.26	8.38	9.69	3.57

Table XXXV.—Number of Deaths from Measles per 100,000 of Population.

YEARS.	Boston, Mass.	New York, N. Y. (old city).	Philadelphia, Pa.	Chicago, Ill.	Brooklyn, N. Y.	St. Louis, Mo.	London, England.	Paris, France.	Vienna, Austria.	Glasgow, Scotland.	Liverpool, England.	Berlin, Germany.
1899.....	5.95	18.82	.55	10.25	17.41	2.34	46.89	37.49	44.67	74.67	47.56	28.71
1900.....	15.69	22.86	29.53	11.42	26.57	7.82	43.15	34.52	44.73	34.93	22.04	27.22
1901.....	18.15	12.84	1.97	8.99	13.44	5.69	43.36	21.09	37.47	65.25	68.92	23.34
1902.....	11.49	21.17	8.30	6.76	19.23	1.61	50.56	28.10	44.54	34.17	47.02	19.51
1903.....	8.60	14.27	10.23	14.73	13.03	21.71	44.56	18.21	21.96	44.22	18.41	17.52
1904.....	15.13	23.98	15.62	2.43	25.20	4.82	49.00	24.13	56.79	41.46	96.21	21.12
1905.....	9.07	13.14	3.69	11.61	14.20	7.48	36.54	17.60	30.83	70.13	33.66	20.46
1906.....	10.12	26.86	23.42	6.25	31.75	1.41	40.63	23.76	30.65	47.15	79.28	24.44
1907.....	4.76	16.92	4.33	12.24	19.89	10.85	37.85	.....	30.57	47.08	39.00	18.75
1908.....	24.47	24.50	15.14	8.03	20.56	.97	32.09	.....	45.92	96.54	34.39	13.79

Table XXXVI.—Comparative Death Rates per 10,000 Inhabitants from Pulmonary Tuberculosis in some American and Foreign Cities for the Years 1899-1908.

YEARS.	Boston, Mass.	New York, N. Y. (old city).	Philadelphia, Pa.	Chicago, Ill.	Brooklyn, N. Y.	St. Louis, Mo.	London, England.	Paris, France.	Vienna, Austria.	Glasgow, Scotland.	Liverpool, England.	Berlin, Germany.
1899.....	22.27	26.00	22.24	15.63	21.90	17.04	18.88	40.55	38.67	19.67	19.45	21.60
1900.....	22.23	25.67	21.00	15.54	20.90	17.49	17.50	40.90	38.46	19.08	18.91	23.02
1901.....	23.06	24.70	22.29	14.51	20.46	18.86	18.18	43.24	36.23	18.55	18.97	21.85
1902.....	20.98	22.42	21.08	14.37	18.78	18.21	16.64	42.67	34.40	16.72	18.96	20.36
1903.....	20.59	23.39	22.15	15.64	18.55	17.46	15.92	38.93	34.14	15.82	17.55	19.17
1904.....	21.40	23.77	22.14	16.20	19.73	19.39	16.55	45.53	31.44	16.17	17.72	20.91
1905.....	20.00	23.75	19.73	16.09	17.76	18.35	14.53	42.10	33.32	13.94	15.93	20.90
1906.....	19.34	23.94	21.52	15.73	16.07	18.52	14.78	37.58	28.94	15.50	15.84	18.71
1907.....	18.29	23.73	21.04	16.49	17.37	15.62	13.98	.....	28.75	15.50	14.97	18.59
1908.....	17.21	22.63	20.00	15.44	16.64	15.19	13.38	38.69	27.53	13.67	15.83	18.48



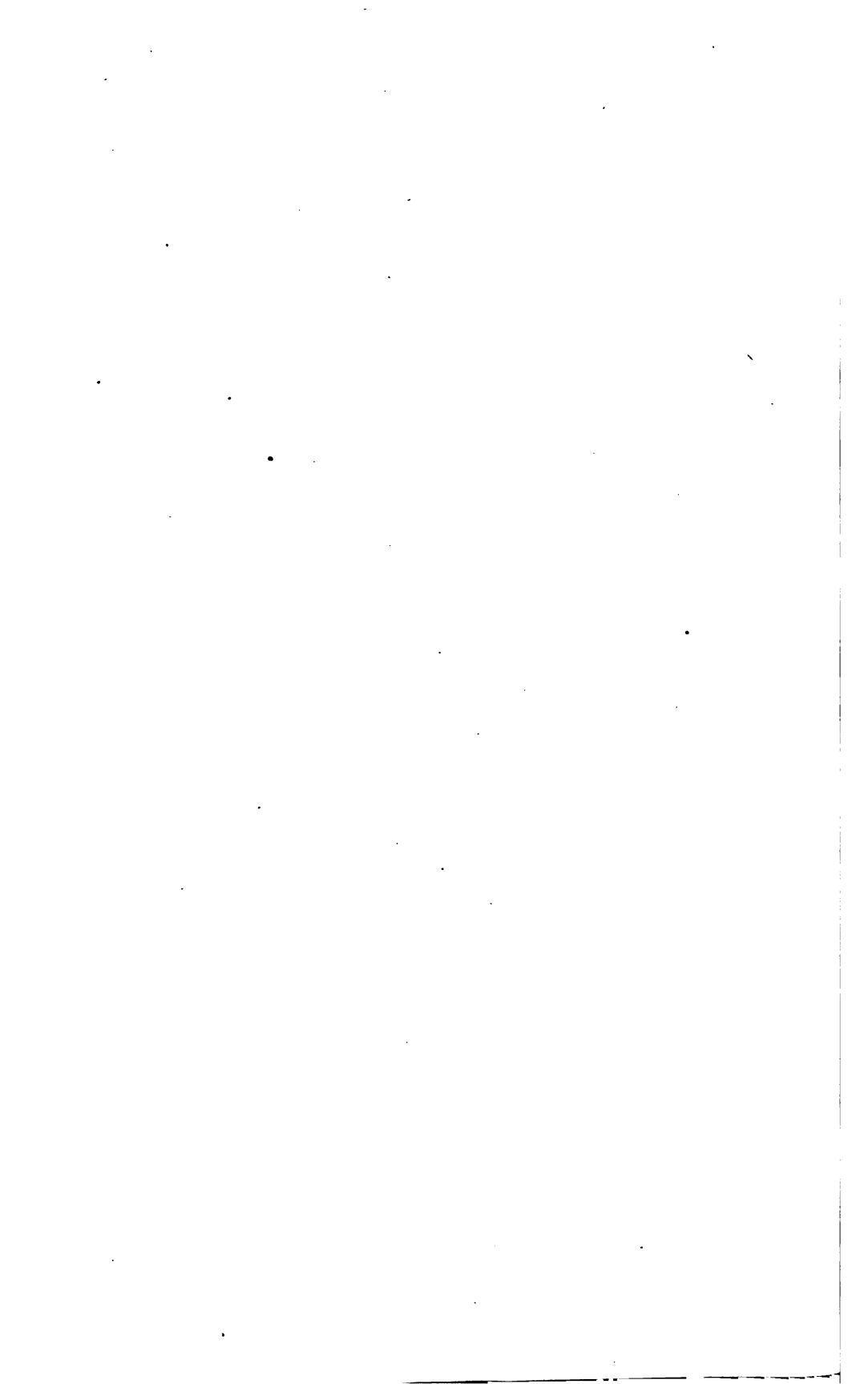


Table XXXVIII.—Cremations Carried out in Great Britain Since the Opening of Woking Crematorium in 1885.

CREMATION.

For centuries the method of disposal of the dead was entombment and earth-burial. About a quarter of a century ago cremation of dead bodies was introduced, and this method is now gradually spreading among civilized nations, as will be seen by the following table.

In order to ascertain the annual increasing number of cremations, official inquiries were addressed to the superintendents of the different crematories in the United States and Europe.

CREMATORIES.																					Total.				
	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.		1905.	1906.	1907.	1908.
Woking.....	3	10	13	28	46	54	99	104	101	125	150	137	173	240	240	301	273	275	143	138	95	140	108	119	3,115
Manchester.....								3	30	47	58	52	51	62	88	83	96	81	92	98	97	90	98	116	1,242
Glasgow.....											1	10	16	12	16	20	18	20	24	19	35	44	30	28	293
Liverpool.....												2	10	27	23	40	40	54	35	40	35	46	34	32	418
Hull.....																	17	13	18	20	15	17	29	37	166
Darlington.....																	1	2	1	7	4	13	8	6	42
Golders Green.....																		5	158	220	252	298	290	364	1,587
Leicester.....																		1	5	8	16	12	12	14	68
Birmingham.....																			1	19	22	25	33	18	118
Leeds.....																					16	15	16	24	71
Ilford.....																					9	23	18	19	69
Bradford.....																					1	14	13	6	34
Sheffield.....																					7	6	18	12	43
Total.....	3	10	13	28	46	54	99	107	131	172	209	201	250	341	367	444	445	451	477	569	604	743	707	795	7,266

Table XXXIX.—Cremations in the United States, 1876-1908, Inclusive.

CREMATORIES.	Date estab- lished.	1876 to 1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.
New York City (U.S. Cre- mation Company).....	1885			9	77	67	83	108	160	187	186	232	243	296	330	331	468	528	602	654	647	720	841	845	904	932	723
Buffalo, N. Y.....	1885			1	8	17	16	23	30	38	27	30	31	41	28	44	40	43	67	50	60	55	74	64	68	75	73
Troy, N. Y.....	1890								4	10	14	15	12	10	18	14	13	20	16	19	23	20	20				
Swinburne Island, N. Y.,	1889								2		60	28	8	1	1	3	3	4	2	3	3	2	3	3			
Waterville, N. Y.....	1893											1	1	6	5	4	4	6	10	1	6	1	5	10	2	5	2
St. Louis, Mo.....	1888						21	20	42	60	64	72	87	96	86	118	109	123	142	135	136	165	190	159	202	174	180
Philadelphia, Pa.....	1888						14	28	31	51	62	63	74	88	85	78	114	99	118	118	130	158	160	168	131	155	137
San Francisco, Cal. (Old Fellows).....	1895													66	101	214	260	347	547	666	614	695	893	951	799	818	909
Boston, Mass.....	1893											1	87	88	135	160	167	235	188	171	217	225	211	227	238	276	274
Cincinnati, O.....	1887						11	21	34	45	43	34	42	66	46	71	59	56	81	89	69	79	92	92	100	117	132
San Francisco, Cal. (Cy- press Lawn).....	1893												42	111	88	54	65	107	98	91	352	169	133	114	105	141	195

Table XL.—Summary of Cremations in Italian Cities.

* Cities.	Date of Inauguration.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.
ITALY.																																		
Milan.....	1876	2	8	15	25	40	70	67	44	61	70	61	55	76	87	71	65	66	74	72	65	65	104	92	99	92	103	107	99	89	122	107	100	106
Lodi.....	1877	...	6	2	2	5	2	2	2	1	4	1	3	3	3	3	3	1	3	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...
Rome.....	1883	...	...	...	...	...	15	29	43	32	52	90	74	47	75	55	61	54	49	37	29	55	52	59	54	66	63	70	77	74	70	...	...
Cremona.....	1883	...	...	...	...	...	4	15	5	25	9	10	5	8	4	3	4	7	3	3	2	3	6	3	1	4	4	3	3	1	...	...	...	...
Brescia.....	1883	...	...	...	...	...	5	2	5	4	3	2	2	4	1	1	3	2	1	3	3	4	1	1	3	...	3	6	6	3	3	...	...	...
Iadue.....	1884	...	...	...	...	...	...	...	...	4	5	5	4	7	5	6	4	3	8	3	3	4	2	3	4	...	...	...	...	...	...	...	...	...
Udine.....	1884	...	...	...	...	...	2	4	5	...	4	2	3	2	6	2	2	2	1	1	3	2	6	2	...	7	6	4	2	4	...	...	...	...
Varese.....	1884	...	...	...	...	...	1	1	1	5	...	5	...	5	...	1	2	1	...	1	3	3	2	2	...	...	...	...	...	...	...	...	...	...
Spezia.....	1885	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	3	...	...	...	...	...
Novara.....	1885	...	...	...	...	...	1	2	2	1	3	1	...	...	...	...	...	7	1	3	1	1	2	4	...	3	3	1	2	3	1	8	...	...
Florence.....	1885	...	...	...	...	...	14	16	26	18	21	20	16	24	18	19	24	14	18	13	14	17	16	21	24	18	33	27	37	30	...	...	...	...
Livorno.....	1885	...	...	...	...	...	8	13	20	10	20	26	9	16	16	11	9	24	9	13	13	14	22	25	19	...	...	...	...	...	...	...	...	...
Asti.....	1885	...	...	...	...	...	1	...	4	3	3	2	3	4	...	2	...	1	...	4	...	1	...	4	...	1	2	...	1	1	...	...	2	...
Pisa.....	1885	...	...	...	...	...	8	3	1	3	2	8	1	7	6	7	3	1	2	2	6	10	4	13	13	8	16	20	22	20	...	...	...	...

Table XLI.—Summary of Crematories and Cremations in Several European Cities.

CREMATORIES.	1878 to 1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	
Germany.	Gotha.....	215	76	95	110	95	128	111	162	162	153	139	132	147	188	179	200	189	218	234	276	301	870	445	465	594
	Hgidelberg.....								3	57	50	79	91	96	105	125	151	146	104	164	146	155	127	86	103	93
	Hamburg.....									2	48	98	41	70	81	98	111	145	181	187	225	280	367	....	466	567
	Jena.....															21	46	47	81	91	123	198	215	183	195	249
	Offenbach.....															.....	5	110	82	128	118	123	142	155	177	215
	Total.....	215	76	95	110	95	128	111	165	221	251	316	264	313	374	423	513	637	666	804	888	1,057	1,721	869	1,406	1,718
Sweden.	Stockholm.....				13	23	46	27	48	41	51	42	31	47	54	49	54	54	46	46	48	49	55	49	61	54
	Gottenberg.....							11	9	11	12	7	3	14	19	24	21	16	16	20	19	18	30	21	26	33
	Total.....				13	23	46	38	57	52	63	49	34	61	73	73	75	70	62	66	67	67	85	70	87	87
France.	Paris.....						749	3,388	3,741	3,974	3,911	3,992	4,180	4,423	4,197	4,513	4,554	5,825	310	300	270	354	352	371	.....	*403
	Rouen.....															.....	5	4	4	1	6	7	4	14	.....	6
	Total.....						749	3,388	3,741	3,974	3,911	3,992	4,180	4,423	4,197	4,513	4,559	5,829	311	306	277	358	356	385	.....	409
Switzerland.	Zurich.....						21	32	39	39	41	40	44	64	69	82	81	116	126	159	158	209	273	298	363	382
	Basil.....															17	14	20	17	30	30	36	43	44	72	77
	Total.....						21	32	39	39	41	40	44	64	69	99	95	136	143	189	188	245	316	340	435	459
Denmark.	Copenhagen.....										4	12	18	21	14	18	28	28	34	44	51	47	73	77	75	102

* Cremations as requested by private parties..... 403
 Anatomical remains from hospitals..... 2,653
 Embryos..... 3,512
 6,568

CONTAGIOUS DISEASES.

Consumption.

The death rate from consumption in Boston has steadily decreased for many years, and particularly so during the last twenty years. Our highest recorded death rate from this disease occurred in 1853, when it amounted to 48.16 in each ten thousand of the population.

The average from 1850 to 1855 was	. . . . .	47.36
The average from 1880 to 1885 was	. . . . .	40.91
The average from 1885 to 1890 was	. . . . .	35.44
The average from 1890 to 1895 was	. . . . .	28.88
The average from 1895 to 1900 was	. . . . .	24.05
The average from 1900 to 1905 was	. . . . .	21.75
The death rate for 1906 was	. . . . .	19.67
The death rate for 1907 was	. . . . .	18.66
The death rate for 1908 was	. . . . .	17.73

Diphtheria and Croup.

The average death rate from diphtheria and croup per		
10,000 of population for 10 years ending 1905 was	. . . . .	4.91
The rate for 1906 was	. . . . .	2.52
The rate for 1907 was	. . . . .	2.36
The rate for 1908 was	. . . . .	3.31

Scarlet Fever.

The average annual death rate from scarlet fever per		
10,000 of the population for 10 years ending 1905 was	. . . . .	1.78
The rate for 1906 was	. . . . .	0.65
The rate for 1907 was	. . . . .	0.80
The rate for 1908 was	. . . . .	1.69

Diphtheria and scarlet fever have both been unusually prevalent in Boston and other New England cities and towns during the last year. Although greater care was exercised in the attempt to isolate and prevent the spread of these diseases than ever before in the experience of this department, both diseases continued with a large excess of cases, as will be seen by a foregoing table, covering a period of ten years. The finding and isolating of cases of infectious diseases are the two principal methods by which their prevalence may be lessened or suppressed. It is apparent to the Board of Health that more search for cases in the homes, more care in the

diagnosis and reporting by physicians, more surveillance and restrictions over cases in the homes, less risk in school attendance, and more hospital accommodations by the city will be required. The Board of Health will hope to be supported in an effort to carry out its part of these necessary changes, notwithstanding its present inadequate appropriation to meet the demands. The City Hospital accommodations for diphtheria and scarlet fever have been inadequate for more than the ordinary demand for many years, far below the standard in amount if measured by the means furnished in other cities, and on any moderate increase in the number of cases overcrowding must be resorted to. On several occasions in the last three years the present accommodations have proven totally insufficient even after overcrowding was carried to the last degree, with a large number of cases boarded elsewhere at the expense of the city, and a large number left in homes where isolation was impossible. A large increase in infectious diseases may occur in any city any time, and its extent and duration will depend primarily on the adequacy of means furnished for the proper isolation of the cases. We beg, in behalf of the Trustees of the City Hospital, that they be allowed a sufficient appropriation to increase their present accommodations for infectious diseases to such an extent as their own superintendent and other such competent authority may recommend.

Leprosy.

The first case of leprosy found in Boston and placed in isolation was in 1890. One was found on an immigrant steamer in 1895, in an advanced stage of the disease, detained at quarantine for a few days, and returned to Sweden under United States Immigration Laws. Since that time a larger number of cases has been found, placed in isolation at Gallop's Island, and held until removed to Penekese Island by the state authorities in 1907. The purchase of Penekese Island and the establishment of a comfortable home there by the state for persons afflicted with this disease at once relieved the City of Boston and other parts of the state (where any action was taken) of the multiple provisions and care which had prevailed with reluctance and under many disadvantages. This act of the state has added greatly to the likelihood of seeking, reporting and isolating these cases when they are to be found within the state.

The following is a list of the cases cared for in Boston during the period referred to:

1890.....	From steamer "Samaria."	Returned to Sweden on same ship.
1895.....	From East Boston.	Died 1897.
Nov. 27, 1900.....	From Eye and Ear Infirmary.	Escaped while in greatly improved condition.
1904.....	From 21 Yeoman street, Roxbury.	Sent to Penekese Island.
1904.....	From Marine Hospital, Chelsea.	Sent to Penekese Island.
1905.....	From Newburyport, Mass. Walked into office.	Sent to Penekese Island.
1906.....	From Massachusetts General Hospital.	Sent to Penekese Island.
1907.....	From Warren avenue.	Sent to Penekese Island.
1907.....	From Massachusetts General Hospital.	Sent to Penekese Island.
1907.....	From 171 Chelsea street, East Boston.	Sent to Penekese Island.
1907.....	From Massachusetts General Hospital.	Sent to Penekese Island.
1909.....	From 11 Margaret street, City.	Sent to Penekese Island.
1909.....	From Massachusetts General Hospital.	Sent to Penekese Island.

Measles.

The highest death rate per 10,000 of the inhabitants in Boston occurred in 1849, when it amounted to 15.83, and for the period between 1845 and 1850 it was 7.29.

From 1880 to 1885 it was	2.01
From 1885 to 1890 it was	1.17
From 1890 to 1895 it was . . . . .	.39
From 1895 to 1900 it was . . . . .	.72
From 1900 to 1905 it was	1.24
The rate for 1906 was	1.01
The rate for 1907 was . . . . .	.48
The rate for 1908 was	2.45

Ophthalmia Neonatorum.

YEARS.	Cases Reported.	Treated in Hospital.	Brought from Other Cities.
1905 (from September 5).....	16	3	..
1906.....	34	13	1
1907.....	17	7	..
1908.....	39	31	2
1909 (to June 1).....	46	34	13

All cases of ophthalmia neonatorum reported and not already under treatment in hospital are seen by a medical

inspector, and if proper care cannot be secured in the home the case is sent to the hospital.

It will be seen that the percentage of reported cases which go to the hospital has largely increased, as has also the number which come from outside the city.

Smallpox.

The highest death rate from this disease in each ten thousand inhabitants in Boston occurred in 1873, when it amounted to 27.77.

From 1870 to 1875 the death rate averaged . . .	7.05
From 1840 to 1870 the death rate averaged . . .	3.85
From 1875 to 1905 the death rate averaged . . .	.22

There were no deaths in 1906, 1907 or 1908.

Typhoid Fever.

The highest death rate from typhoid fever in Boston in each ten thousand of the population occurred in 1872, when it amounted to 8.62.

The average from 1870 to 1875 was	7.09
The average from 1875 to 1880 was	3.92
The average from 1880 to 1885 was	5.19
The average from 1885 to 1890 was	3.91
The average from 1890 to 1895 was	3.11
The average from 1895 to 1900 was	3.06
The average from 1900 to 1905 was	2.44
The rate for 1906 was	2.03
The rate for 1907 was	1.05
The rate for 1908 was	2.58

OUTBREAK OF TYPHOID FEVER, DUE TO INFECTED MILK.

An outbreak of typhoid fever of uncommon magnitude occurred in April in the Jamaica Plain district, caused by infected milk. The first warrantable suspicion of a common cause of this outbreak reached the office April 2. The direct cause of the outbreak was ascertained and the corrective measures applied on April 3 and continued thereafter as long as needed. The whole force of medical inspectors, consisting of Drs. Thomas B. Shea, David D. Brough, Alexander Burr, and William H. Davis, were at once engaged in the extra work of this outbreak, in which cases continued to occur for several weeks, although the primary cause was of limited duration. The data, methods pursued and conclusions drawn by the department have been compiled by Dr. Brough, and are as follows:

In the early part of the year an outbreak of typhoid fever occurred which was caused by infected milk. In the number of cases and the severity of the disease it has never been equaled in this city. In the whole list of recorded milk outbreaks there are few that have surpassed this in the number of individuals attacked. It is only in a water borne infection that we expect the disease to be so widespread.

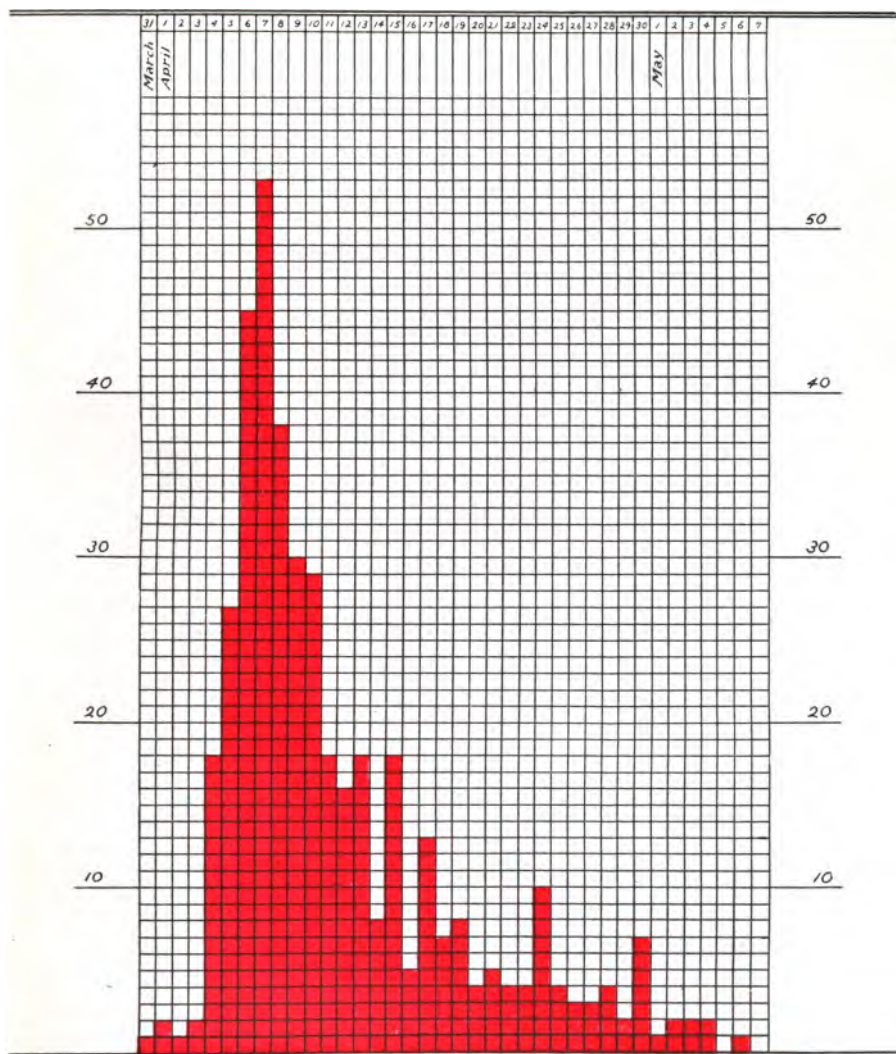
The outbreak occurred in a residential section of the city, in the Jamaica Plain and adjoining Roxbury district. This part of the city is a substantial residential one, consisting of detached wooden houses, frequently occupied by one family, or of apartment houses which have generally two and seldom more than three families living in them. Most of the houses are of wood and are surrounded by small open yards. It is a typical suburban district.

The residents are a generally well to do, intelligent class, and are largely American, with many Irish and Germans.

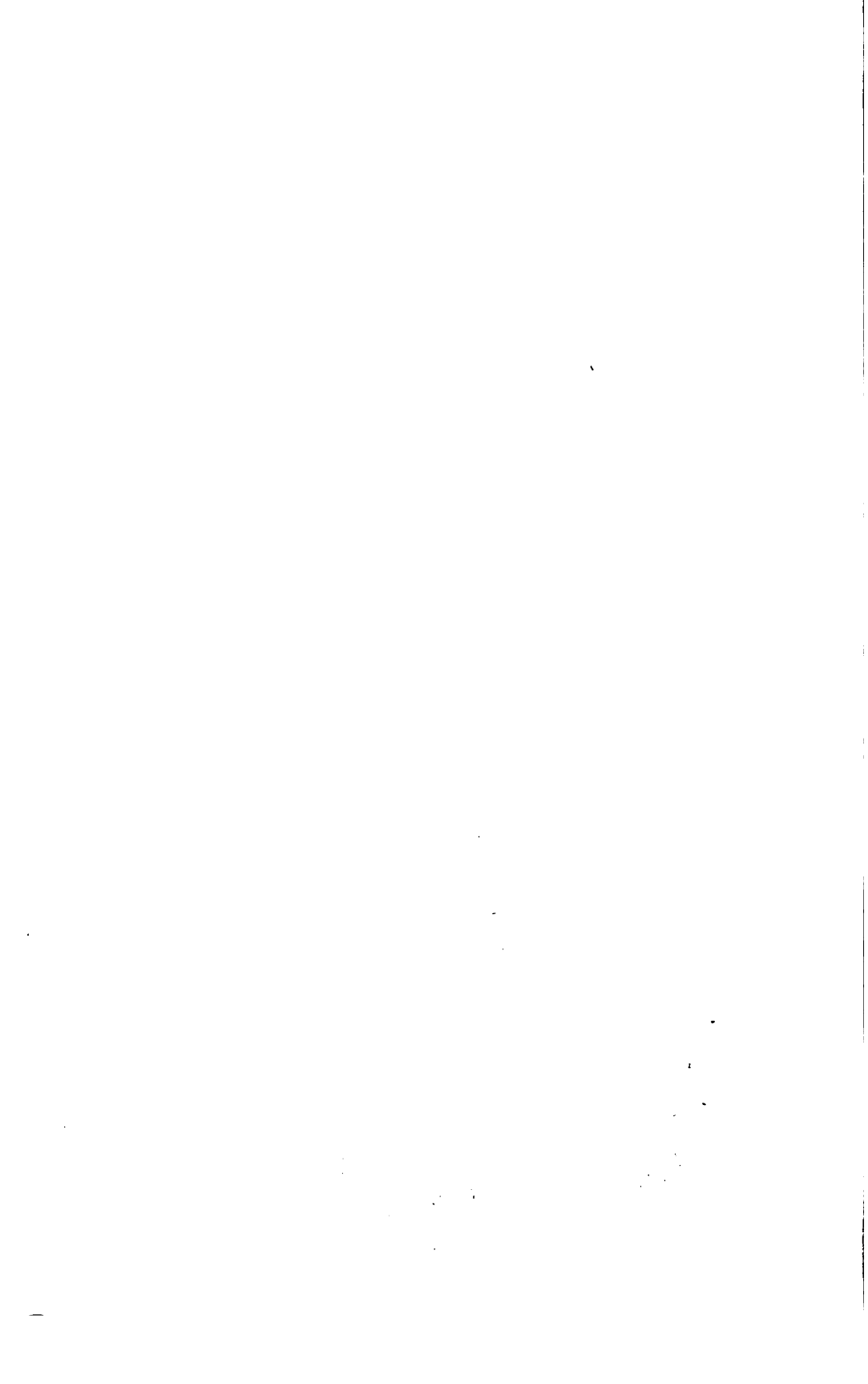
The first was reported March 31, and then cases began to come in rapidly from day to day as seen from the following list:

Cases as They Were Reported From Day to Day.

DATE.		Jamaica Plain.	Roxbury.
March	31.	1	
April	1.	2	
	2.	1	
	3.	2	
	4.	18	
	5.	27	
	6.	45	
	7.	43	10
	8.	37	1
	9.	27	3
	10.	26	3
	11.	16	2
	12.	14	2
	13.	12	6
	14.	8	
	15.	15	3
	16.	5	
	17.	12	1
	18.	6	1
	19.	7	1
	20.	4	
	21.	3	2
	22.	3	1
	23.	3	1
	24.	8	2
	25.	4	
	26.	3	
	27.	3	
	28.	3	1
	29.	2	
	30.	7	
May	1.	1	
	2.	2	
	3.	2	
	4.	2	
	5.		
	6.	1	
	7.		
Totals		375	40



REPORTED CASES OF TYPHOID FEVER IN JAMAICA PLAIN AND ROXBURY MARCH 31 TO MAY 7, 1909, INCLUSIVE.



There were 415 cases in Jamaica Plain and Roxbury from March 31 to May 8.

384 primary or direct infection.

31 probably secondary or contact cases from the primary.

415

In 70 per cent of the cases the first symptoms appeared before April 8, though many of them were not reported by the physicians until a later date.

These 415 cases occurred in 295 families.

Statistics of 163 families showed a population of 834, and of these 217 contracted typhoid, that is 26 per cent had the disease. Applying these figures to the whole 295 families would give a population of 1,475, of whom 415 contracted typhoid, showing about 28 per cent of the persons exposed came down with the disease.

Deaths in these cases to May 8, 27,—a mortality of about 15 per cent.

One hundred and ninety-four of these cases went to the hospital, or 47 per cent.

The early cases were supposed to be due to infected milk, and investigation immediately strengthened these suspicions. As the cases were visited it was found they were all on the routes of two milkmen who supplied the Jamaica Plain and adjoining Roxbury districts. The milk had either been directly supplied to the families or had been purchased at stores and bakeries supplied by one of these two men. There was no reason for suspecting any other cause; the only other common factor was the water, and this was the same as used in all other parts of the city. There were other milkmen in the district, but no cases occurred on their routes. It was plain that there was some source of infection common to these two men. By placing a mark on the map of this district for each case the routes of these two men could be distinctly traced.

This report has only considered the cases from March 31 to May 8, when the outbreak may be considered ended. The few subsequent cases do not at all affect the results, as they were probably secondary cases or those that had been taken ill early and not reported until very late.

Out of the 415 cases it was found that

72 used only F.'s milk.
115 partially used F.'s milk.

187

81 used only Q.'s milk.
114 partially used Q.'s milk.

195

33 no history of using either F.'s or Q.'s milk.
 187 cases used F.'s milk at some time.
 195 cases used Q.'s milk at some time.

415

Ages of 415 Cases.

AGES.											
Total under 5 years.	5 years and under 10 years.	10 years and under 15 years.	15 years and under 20 years.	20 years and under 25 years.	25 years and under 30 years.	30 years and under 35 years.	35 years and under 40 years.	40 years and under 45 years.	45 years and under 50 years.	50 years and over, under 55 years.	Adults.
68	81	57	32	40	32	22	17	16	12	10	24

These two milkmen received their daily supply from a car supplied by one milk contractor. This milk was collected from various farms in Worcester county, brought in a milk car to Forest Hills and there delivered in the original cans direct to the milkmen. Besides these two milkmen there were six others who received milk from this car, but no cases occurred on their routes, though in the aggregate their customers were greater than those of F. and Q., on whose routes the outbreak occurred.

Mr. F. received all his milk from this car. Mr. Q. received a portion of his milk from this car and a part from another contractor. It was on the 14th of March that Mr. Q. first began to take milk from this car. Up to the 14th there was absolutely nothing in common between F. and Q.

The supply that Mr. Q. had from the other contractor was easily excluded, as that supply was not taken by the other milkman, Mr. F.

Each milkman was assigned his supply from certain dairies and no others. Mr. F. had six and Mr. Q. had seven. Of these thirteen dairies only one, which was a large dairy, furnished milk to both F. and Q. It was immediately suspected that the infection might have arisen at the farm. But a careful examination of this farm and all the employees here, together with all the farms that supplied milk here, failed to show any illness. Specimens of blood, urine and waters from the wells were examined and all proved negative. It was also found that a considerable portion of this same milk that F. and Q. received was delivered to the town of Marlboro. In this place there were no cases of typhoid in the families where the milk was used. This was an absolutely

convincing proof that there was no infection of the milk supply at the dairy farm.

A searching investigation was made of all the other dairies that sent milk to the car, but no case of illness was found on any. It therefore seemed improbable that infection could have occurred on the farms.

The milk after leaving the dairy, in cans, was placed on the car and was not handled in transit. After the car reached Forest Hills it was switched on a siding. The various milkmen then drove up to the car and took or received their proper supply.

An examination was made of the blood and urine of the train hands and the health of their families carefully looked up. They were all found to be free from any present or past evidence of typhoid.

One of the early cases to be reported was the milkman F. He took to bed on March 31 or April 1, and a physician called. It was soon learned from the clinical history that he had been ill for some time though not confined to the house. On March 20 he had consulted a physician, and this date was verified from the physician's day book, saying he had not been well for four or five days previously. It was found that about March 15 he had given up the harder work, and feeling run down had taken the easier and lighter work of receiving and tasting the milk supply at Forest Hills station. The usual time for going there was in the later morning hours.

From the 15th of March until the 31st, with the exception of one or two days, Mr. F. tasted all the milk he received.

After the milk had been tasted what was accepted was taken to the milk room and placed in a mixer. After being mixed it was bottled and delivered to the various customers. It is easily seen how if one can was infected the whole milk supply would be contaminated.

On April 10 Mr. F. died. He had suffered from intestinal hemorrhages for a few days previously. An autopsy was performed and the age of intestinal lesions verified the clinical history that he had been ill with typhoid for a considerable period, probably as early or earlier than March 15.

The milk car was divided into compartments. F. and Q. had one compartment for their exclusive use. F. received daily about 35 or 40 large cans, each holding $22\frac{1}{2}$ quarts. It was in this way the milk came from the farms. Before accepting any milk it was the custom to taste it. If the taste suited it was taken, otherwise not. This method of tasting is the one which all milkmen in this locality were accustomed to use. After taking the cover from the can Mr. F. dipped a

spoon with his hand into the milk and tasted it. If it was satisfactory he accepted this can, if not he rejected it. The same spoon was used in the examination of all the milk. Any infection on the fingers or hands would be carried to the milk in the process of dipping the spoon into the can.

It is thus seen that Mr. F. was capable of infecting the milk from March 15 to March 31 inclusive, when he stopped going to the car.

Most of the milk came from one large dairy. He took what he wanted of this after tasting. What he did not want was given to Mr. Q. or became so-called surplus milk. No other milkman except Mr. Q. received any from this dairy. It is easily seen that any of this milk that had been tasted by Mr. F. could have been taken by Mr. Q. It is our opinion that F. in the course of tasting not only infected such as he supplied to his own customers, but the milk he and Q. had in common, or such as became surplus milk. (Reference will be made later to this surplus milk.) The fact that Q. was the only one to receive any milk handled or tasted by F. explains why the other men receiving milk from this car had no cases on their routes.

While there is difference of opinion as to which man arrived at the car first, on every day, it is known positively from the milk receipts that F. was at the car first and handled the milk before Q. received it. This was on the 18th of March. Now there is absolute proof that one case of typhoid was infected between the 16th and 19th of March from Q's milk. A nurse was attending a case (not typhoid) in this district from the 16th to 19th of March and drank Q's milk at that time. She moved away after the 19th to another district where she was taken ill (on March 26). It is highly probable that both supplies were infected at that time, if not at other dates.

We have carefully excluded all other possible sources of infection.

1. The only dairy that F. and Q. had in common sent a large portion of the same milk to a neighboring town. There were no cases in this town. The examination of all other dairies showed them absolutely free from disease.

2. In transit, there was no illness on the car or amongst the train hands. As the milk was not handled on the route there was here no possible opportunity for infection.

3. After the milk had left the car it might have been infected at the milk room, but if this had occurred there would have been an infection on only one route.

4. It has been suggested "that there was the greatest possibility of an interchange of cans between F. and Q., for it was the custom to return the cans to the car washed, but by no means sterilized, and that after they were filled at the

dairy Q. was as likely as F. to receive cans that had been supplied to and returned by Q. and that therefore the infection was spread by the cans." This theory, however, has no basis of fact. The milk contractor states the cans do not get back to the same dairy from which they came. As the cans are returned to the car the old dairy numbers are removed, and it is impossible to tell which milkman had the can. On the car the cans, some two hundred, are mixed together. As the car returns on its up-country journey the cans are put off anywhere. Now if the cans had been the source of infection, as suggested above, the outbreak instead of being confined to the routes of these two men would have been distributed over many, for there was a great deal more probability of other men receiving them than these special milkmen.

At about the same time an increased number of cases occurred in East Boston. From April 7 to May 7 132 cases were reported. A very large number of them were on the routes of men who were supplied by the same contractor who supplied the car at Forest Hills. It was found that there was a direct relation between the Jamaica Plain and the East Boston cases. The so-called surplus milk, some of which had probably been infected by F., was taken by rail to Cambridge and there mixed with other milk, and was delivered to the East Boston dealers. That some of this infected milk found its way into this supply is evident, as the outbreak in East Boston occurred at the same time, continued over the same period, and it is positively known that this surplus milk was delivered in East Boston. The cases were either infected by milk supplied directly to the houses by the milkman or from stores furnished with this same supply.

Daily Report of East Boston Cases.

April 7.....	3	April 23.....	2
8.....	7	24.....	15
9.....	6	25.....	2
10.....	2	26.....	1
11.....	6	27.....	2
12.....	7	28.....	0
13.....	6	29.....	1
14.....	6	30.....	5
15.....	17	May 1.....	6
16.....	1	2.....	2
17.....	8	3.....	1
18.....	3	4.....	1
19.....	2	5.....	0
20.....	1	6.....	7
21.....	4	7.....	3
22.....	5		
		Total.....	132

NOTE.—In the whole city during this period there were 700 cases of typhoid, and of these 547 occurred in two sections, and were due to infected milk.

PREVENTATIVE METHODS ADOPTED.

The milk supply of F. and Q. was temporarily changed. All their milk utensils were disinfected and all the cans on the car. The milk vessels of F. and Q. were for a period disinfected daily. No milk jars were removed from infected houses. Milk left at infected houses was poured into vessels left outside the door.

The milk cans and crocks at the various stores and bakeries throughout the city were ordered to be disinfected. Personal cleanliness and disinfection of the hands of those handling milk was strongly insisted upon.

To avoid any possibility of any ambulatory cases among the milkmen both they and their families were inspected daily during the outbreak.

When the source of the infection had been found the future course of the outbreak was predicted. It will be seen from the table of dates that the appearance of cases occurred in strict accord with what might have been expected. There was no evidence of renewed infection during the outbreak. The secondary cases were contacts from the original infected cases.

There was absolutely no knowledge of harm to be attached to either milkmen in anything they did in connection with the outbreak. They were wholly innocent. It directed the attention of the Board to the method of testing milk that was fraught with danger. A new regulation was immediately put in force, and danger of the milk being infected from the testing process has been removed.

The most careful precautions were taken to prevent any further spread of the disease. Every case was investigated, and every detail in regard to each case obtained. A circular containing information and instructions in the care of the disease to prevent its spread was given to each family and to the physicians. The disinfection of the hands of the attendants, the care of the stools, the care of the dishes, etc., was insisted upon. Strict isolation and placarding of rooms was insisted upon. All cases thought to be improperly cared for at home were sent to the hospital.

After death, removal or recovery, the premises in every case were washed with corrosive and disinfected with formaldehyde gas.

A SECOND OUTBREAK CAUSED BY INFECTED MILK FROM AMBULANT TYPHOID.

In September a small outbreak of typhoid occurred in the Allston district. Up to October 8 fifteen cases were found

on the route of one milkman. Four cases also occurred in the neighboring Brookline district, where the same milk was delivered. All the cases were taken ill about the middle of September.

The milk supply of this man was from various farms in Sudbury, and was brought to the milk rooms in Waltham. Here it was mixed and bottled for delivery. Everything was found in most excellent condition. It was a model milk room. No one was found to be ill. It was learned that one of the helpers was taken ill a few weeks before. The last day he worked was September 6. On September 12 he was taken to the Waltham Hospital. On September 15 he was operated for perforating ulcer of the intestines and peritonitis. He fortunately recovered. From the condition of the intestines and the history he was judged to have been ill from August 25. From then until September 6 he was an ambulant case of typhoid, and during that time he was at work. Most of his work was on the delivery wagon in the Brookline district. He occasionally assisted in putting the caps on the bottles that were delivered to the Allston-Brookline district. It is probable that, in his condition, he infected some of these bottles. This explains why only a very few of the large number of customers were infected. It was the individual bottles and not the general milk supply that was infected. A portion of the same milk bottled in the same way, but in the capping of which this man took no part, was delivered to some sixty-five customers on the Waltham route, but no cases arose here. The same disinfection and other precautionary measures were used in this as in the preceding outbreak.

SCHOOL INSPECTION.

School inspection in Boston has been continued to the present time on nearly the same lines, with moderate changes, as originally proposed in 1894, but with the new relations with the School Committee and their excellent working corps of school nurses, and the new duties added by an act of the Legislature in 1906, by which the inspection was extended over the state, new rules and other changes to meet the new conditions and to cover additional work will be put in force in September. The largest amount of work done in any year since the work was started was done last year, the details of which will be seen in the following report:

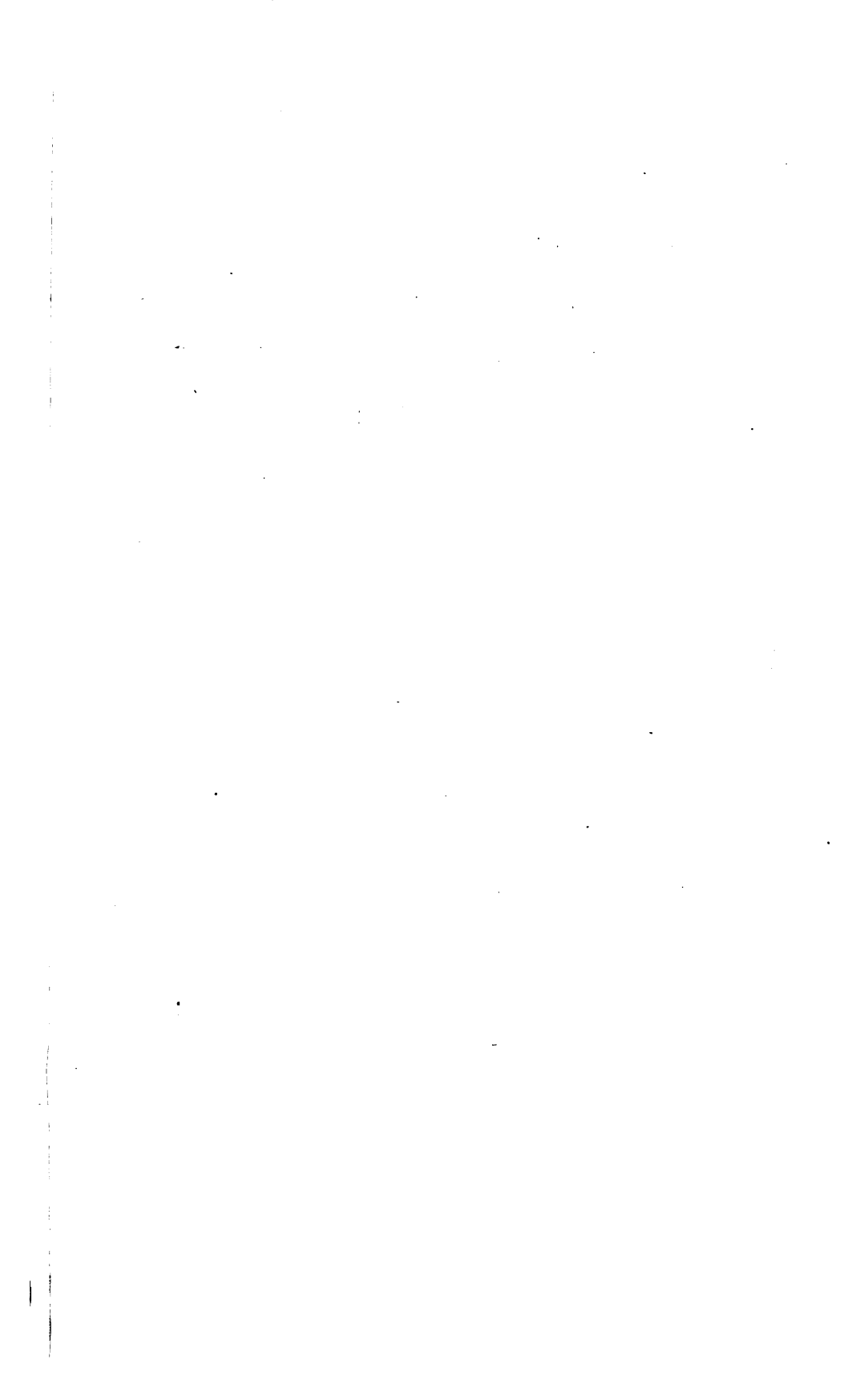
The following is a list of the diseases found in the public and parochial schools during the years 1907 and 1908:

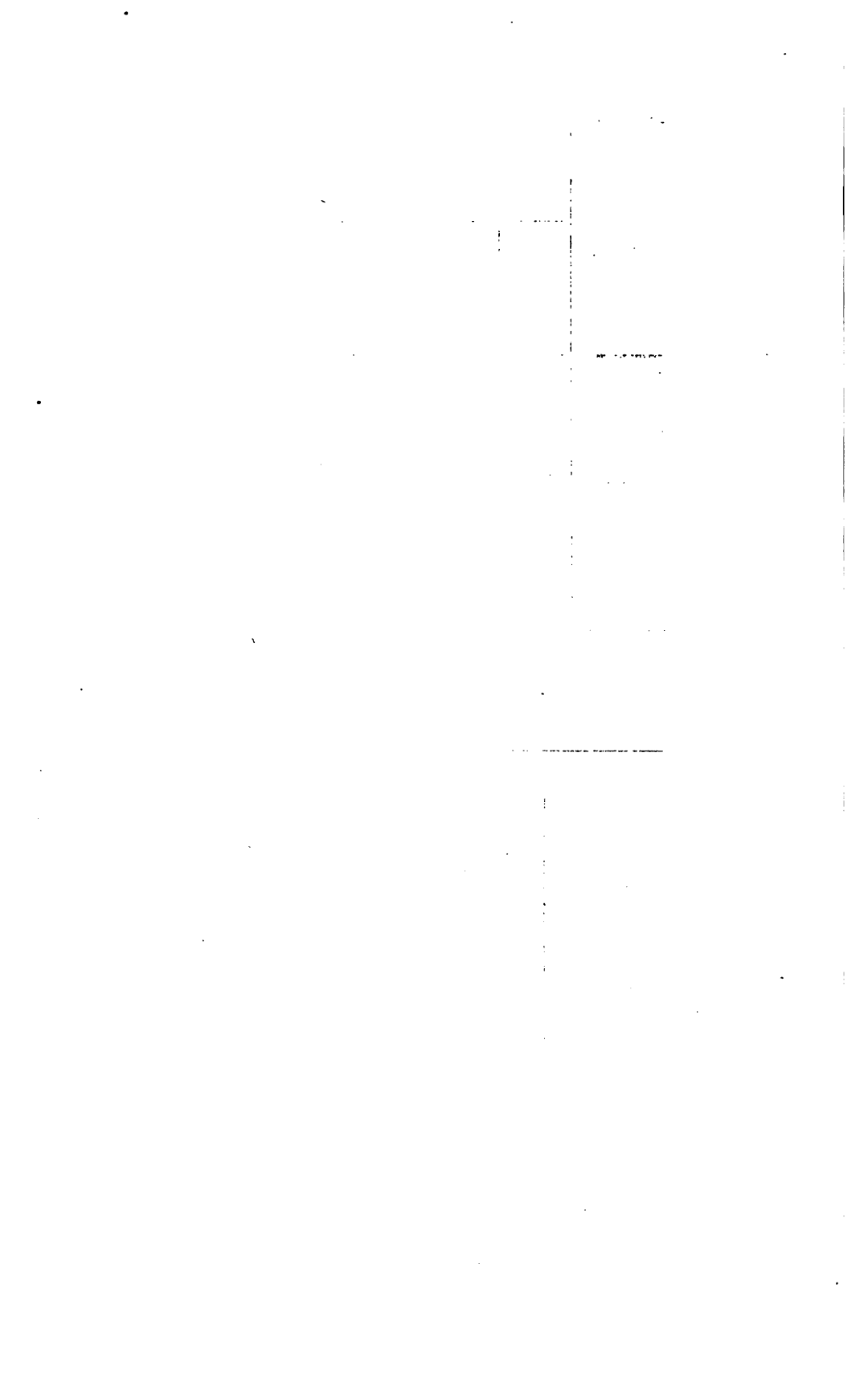
	1907.	1908.
I.— SPECIFIC INFECTIOUS DISEASES.		
Diphtheria	39	33
Scarlet fever	60	47
Measles	31	330
Whooping-cough	123	153
Mumps	110	188
Chickenpox	167	195
Influenza	69	79
Syphilis	3	4
Tuberculosis	62	32
Erysipelas	2	1
Malaria	1	2
Typhoid fever	1	5
German measles		46
II.— DISEASES OF THE ORAL AND RESPIRATORY TRACT.		
1. Mouth.		
Stomatitis:		
(a) Simple (erythematous)	25	42
(b) Aphthous herpetic	7	3
(c) Ulcerative		3
(d) Parasitic (thrush, etc.)	2	
Alveolar abscess	58	70
2. Pharynx.		
Acute pharyngitis	440	554
Hypertrophic pharyngitis (acute and chronic)	45	89
3. Tonsils.		
Acute follicular tonsilitis	1,057	1,192
Hypertrophic tonsilitis	828	1,975
Abscess	3	6
4. Uvula.		
Elongation	9	63
5. Nose.		
Acute rhinitis	205	262
Chronic rhinitis	32	29
Purulent rhinitis	8	37
Ozaena	9	3
Epistaxis	22	34
Deviations of septum	14	30
6. Naso-Pharynx.		
Naso-pharyngitis (post-nasal catarrh)	70	57
Adenoid disease	1,008	2,075
7. Larynx.		
Acute laryngitis	47	73
Chronic laryngitis	8	11
8. Bronchi.		
Acute bronchitis	210	283
Chronic bronchitis	5	28
III.— DISEASES OF THE EAR.		
Foreign bodies (cerumen, etc.)	36	37
Otitis media, catarrhal, acute and chronic	177	213
Otitis media, suppurative, acute and chronic	88	81
Mastoiditis	4	1
Imperfect hearing	138	194
IV.— DISEASES OF THE EYE.		
1. Foreign bodies		
	36	82
2. Eyelids.		
Blepharitis	285	325
Stye	58	141
Ptosis	2	3

	1907.	1908.
<i>3. Lachrymal Organs.</i>		
Abscess	1	1
Obstruction of duct	6	3
<i>4. Conjunctiva.</i>		
Conjunctivitis:		
(a) Acute catarrhal	499	625
(b) Purulent	26	30
(c) Phlyctenular	6	23
(d) Granular	31	66
<i>5. Cornea.</i>		
Interstitial keratitis	10	14
Ulcer	17	26
Opacity	14	14
<i>6. Iris.</i>		
Iritis	17	8
<i>7. Muscles.</i>		
Strabismus	89	52
Nystagmus	3	4
Imperfect sight	731	883
<i>V.—DISEASES OF THE SKIN.</i>		
Acne	161	219
Alopecia areata	16	32
Dermatitis	143	307
Eczema	847	1,023
Erythema multiforme	2	18
Erythema simplex	25	76
Furunculus	85	112
Herpes { simplex	413	483
zoster	13	40
Impetigo contagiosa	1,138	1,418
Pediculosis	5,009	5,674
Pemphigus	4	7
Pityriasis maculata et circinata	5	2
Pruritus	14	10
Psoriasis	27	16
Purpura	1	1
Scabies	658	869
Seborrhoea	193	110
Tinea { favosa	37	73
trichophytina	211	470
versicolor	8	4
Urticaria	39	67
Verruca	30	52
<i>VI.—MISCELLANEOUS DISEASES.</i>		
Anæmia	214	400
Debility	199	253
Headache	156	165
Cervical adenitis	178	395
Chorea	68	77
Ulcer	40	33
Deformities (spinal and extremities)	45	54
Sprains	65	139
Fractures	20	20
Contusions	146	310
Wounds	624	1,339
Abscess	155	171
Dental caries	767	2,320
Neuralgia	29	31
Epilepsy	14	11
Rheumatism	42	34
Cardiac diseases	62	74
Gastric diseases	147	114
Intestinal diseases	50	54
Urinary diseases	31	22
Vaccinations (performed)	632	691
Certificates of vaccination	2,385	2,532
Unclassified	162	898

SUMMARY.

Specific infectious diseases	667	1,115
Oral and respiratory diseases	4,112	6,919
Diseases of the ear	443	526
Diseases of the eye	1,831	2,300
Diseases of the skin	9,078	11,083
Miscellaneous diseases	6,219	10,137
Total	22,350	32,080
Number of pupils examined in the schools,	47,716	51,099
Number recommended to be sent home .	5,182	6,146
Number consultations with teachers and nurses (about pupils returning to school, etc.)	5,278	7,402





MOSQUITOES AND MALARIA.

Since the fact was established some years ago that malaria can be transferred from one person to another only by a species of the mosquito, that he is an inhabitant of this locality, that the breeding of all mosquitoes may be interrupted by a judicious use of oil on the surface of all still water in a given place, that the mosquito does not voluntarily go far from his breeding place, together with the well-known fact that all mosquitoes are an intolerable pest, the Board of Health has continued to use crude oil and to require its use in summer on such stagnant pools of water in public and private places as cannot be economically removed by draining or filling, and which are not supplied with the small fish which are known to devour the larvæ (undeveloped mosquitoes) in such water.

SMOKE NUISANCE.

There has been during the past year a still further reduction in the amount of smoke issued from the premises of those who are included in chapter 418, Acts of 1905.

A very decided and growing interest is also being shown in all parts of the city by those who are responsible for the smoke, as well as those who are not; and better construction, alterations and care are now taking place in the plants from which smoke emanates than ever before, with the very important exception of those plants to which the Act of 1905 does not apply. It is now the latter plants from which the most annoying and damaging smoke spreads over the larger part of the city, and is causing the strongest complaints.

It is to be seriously regretted that "locomotive engines and plants furnishing power for public service corporations and plants burning wood exclusively" should have been exempted from the operation of this law. It is manifestly unfair to deny one business man, firm or corporation the right to damage the public health, comfort and property values by needless volumes of smoke, and at the same time allow others to do the same thing under the same circumstances, and having equal or greater advantages with which to refrain from causing such discomfort and damage. The business man who has done his part to stop the smoke nuisance in Boston, and then finds his own and other homes and business still being needlessly discomfited and damaged by the smoke of his exempted neighbor, is not easily placated.

There is no apparent reason why the requirements of this law, already shown to be both wise and reasonable, should not be made to bear equally upon all.

MORGUE.

The Morgue, which is on North Grove street, is a building constructed by the Board of Health and maintained by it in the matter of salaries and running expenses, although the work is entirely under the control of the medical examiner, who is an officer of the state. A description of the building and its uses, together with suggestions as to needs in the immediate future, are included in a statement submitted by George Burgess Magrath, M. D., Medical Examiner for Suffolk County, Northern District, to the Board of Aldermen (Document 88, 1909). The purpose of the building is to afford a place to which at any hour of the day or night the body of a person may be carried in the circumstances of whose death there seems to be some reason for medico-legal investigation. The Morgue must therefore possess facilities for the receipt in an unobtrusive manner and for the storage of such bodies and for the exhibition of them in a seemly manner to those who are entitled to view them. Conveniences for making autopsies are also necessary. The institution is open during the twenty-four hours, and the staff, as appointed by the Board of Health, includes two regular assistants and a third when necessary. The segregation of bodies at the morgue, which under previous medical examiners were cared for in other places, has brought to view most emphatically the fact that the present facilities are not sufficient for the needs of the district. The columbarium is planned for ten bodies, while at times as many as fourteen have of necessity been cared for, and the occasions for this overcrowding are becoming more and more frequent. A columbarium of at least twenty cells is already a necessity. At the request of the medical examiner the operating room has been fitted with the most approved appliances for the proper dispatch of the work. During the year 1907 there were 218 bodies received in the Morgue, and in 1908, 309.

PAVING AND DRAINING ALLEYWAYS.

The following alleys were paved and drained during the year 1908, by order of the Board of Health:

Alley between Dover and Dwight streets, extending from Shawmut avenue to Tremont street, 15,200 square feet granolithic pavement.

Garland place, leading from 2 Garland street to Shawmut avenue, 1,350 square feet granolithic pavement.

Medford court, leading from 1231 Washington street to dead end, 4,400 square feet granolithic pavement.

Alley rear of houses on southerly side of Lovering place, 200 square feet granolithic pavement.

Alley rear of houses on southerly side of Laconia street, 960 square feet concrete pavement.

The following yards were paved and drained by order of the Board of Health:

10 and 10½ North Grove street, 940 square feet granolithic.

65 Phillips street, West End, 226 square feet asphalt.

Silver place, 1,200 square feet granolithic.

Part of public alley No. 441, between Newbury and Boylston streets, 565 square feet asphalt.

430 Hanover street, 88 square yards concrete.

464 Commercial street, 11 square yards concrete and 56 square yards brick.

Dillaway place, 99 square yards concrete.

Page court, 44 square yards concrete.

Passageway in rear of 225-227-231 Hanover street, 20 square yards of concrete.

101-103 Hudson street, 160 square feet brick.

EXAMINATION OF PLUMBERS.

In compliance with chapter 265 of the Acts of 1897, the Board of Examiners of Plumbers makes the following report:

Number of applications for licenses referred by Building Commissioner to Board of Examiners . . .	272
Number of examinations held . . .	42
Number of applicants examined by the Board . . .	272
Masters	98
Journeymen	174
Number of applicants certified for license . . .	43
Masters	16
Journeymen	27
Number of examination papers rejected, applicants not receiving requisite percentage . . .	229
Masters	82
Journeymen	147

EXAMINATION OF GAS FITTERS.

In compliance with chapter 265, Acts of 1897, the Board of Examiners of Gas Fitters herewith submits a report of proceedings of said Board:

Number of applications for license referred by Building Commissioner to Board of Examiners . . .	224
--------------------------------------------------------------------------------------------------	-----

Number of examinations held	42
Number of applicants examined by the Board	176
Masters	82
Journeyman	94
Number of applicants examined by the Board, certified by the Board to Building Commissioner for license,	75
Masters	53
Journeyman	22
Number of examination papers rejected, applicants not receiving requisite percentage	101
Masters	29
Journeyman	72

REGULATIONS ADOPTED.

During the year the Board has found it necessary to adopt the following regulations:

Respecting the Handling of Milk.

(April 27, 1908.)

Whereas, Milk may be, and frequently is, made the carrier of typhoid fever, diphtheria, scarlet fever and other infectious and contagious diseases, and, *whereas*, the germs of said diseases may be imparted to milk by persons in the act of testing, by tasting or otherwise handling milk before delivery to consumers;

It is therefore ordered: Whoever tests milk or cream which is to be offered for sale in any form by tasting shall do so by means of a spoon or piece of wood, paper, cardboard or other article, and such spoon, piece of wood, paper, cardboard or other article shall not again be brought in contact with milk intended for sale, or be used for testing milk until after being thoroughly washed and sterilized; no person shall permit his hands, fingers, lips or tongue to come in contact with milk intended for sale in any form. All persons engaged in the tasting, mixing or handling of milk for sale in any form shall, before engaging in such tasting, mixing or handling, thoroughly clean his hands and finger nails and keep them clean and dry during such tasting, mixing or handling. No person shall permit his hands while wet to remain or pass over any open vessel containing milk intended for sale in any form. No person shall fill a jar, can or other receptacle with milk while the aforesaid jar, can or other receptacle, is held over an open vessel containing milk intended for sale in any form. No person who has sore throat, diarrhoea, or is suffering from any other disturbance of the bowels, or has symptoms of infectious or contagious disease, shall engage in the handling of milk which is to be offered for sale or which is for sale.

(November 25, 1908.)

All persons having the possession or custody of bottles, cans or other receptacles used in the sale, delivery and transportation of milk, cream, skimmed milk or buttermilk, shall cause

any such bottle, can or receptacle to be cleaned immediately upon emptying the same; and no person shall deliver, receive or have in his possession or custody any such bottle, can or receptacle so used which has not been cleansed as aforesaid.

No person shall expectorate or spit, except in receptacles provided for the purpose, in or upon any part of any room, vehicle, railroad car, railroad platform or other place used for the sale, storage, handling or transportation of milk.

Keeping and Killing Fowls.

(May 9, 1908.)

Whereas, Doubt has arisen as to whether the word "animals" in the second line of the regulation of the Board of Health relating to offensive trades, passed October 13, 1896, is inclusive of fowls, now by virtue of the authority given by chapter 75 of the Revised Laws, the Board of Health of the City of Boston makes the following regulation:

Ordered, That the Board of Health hereby forbids the exercise of the trade or employment of killing fowls or keeping them for the purpose of plucking or killing, within the limits of the City of Boston, except at such place or places as may be assigned by said Board; such trade or employment being a nuisance, hurtful to the inhabitants of said city, dangerous to the public health, attended by noisome and noxious odors, and otherwise injurious to the estates of said inhabitants.

Infectious Diseases.

(June 8, 1908.)

Every owner, lessee, tenant and occupant of any dwelling or apartment in the City of Boston shall forthwith report to the Health Department in writing the removal of any person from such dwelling or apartment who shall be suffering from any of the following infectious diseases: Measles, diphtheria and croup, scarlet fever, smallpox, chickenpox, epidemic cholera, typhus fever, rubella (rötheln), plague, whooping cough or tuberculosis (of any organ).

OFFENSIVE TRADES.

The number of offensive trades in Boston has been gradually reduced in number and very much improved in the methods and means of conducting them. Those of largest magnitude and most offensive in character have been somewhat isolated at Spectacle Island, at a considerable distance from habitation. Those now grouped on the island are:

N. Ward Company (rendering dead animals).

New England Sanitary Product Company (rendering garbage).

International Glue Company.

Continental Export Company.

The odors from these plants have been considerably diminished from year to year by more or less expensive alterations and greater care in their management. These plants are never operated without giving rise to more or less offensive odors, although they may run for several months at a time without causing complaint from the mainland. The odors from the island, however, with favorable wind and a little coolness, are capable of reaching a distance of several miles and causing disturbance in South Boston or elsewhere several times yearly. The offensive trades on the mainland are much smaller, quite local in effect, and much easier to take care of. In dealing with offensive trades, the Board of Health has recognized on the one hand the legitimacy and importance of these industries to the welfare of the city, the extensive outlay of capital, and the inherent difficulties to be overcome in making the operation of such plants tolerable at reasonable distances from habitation, trade and travel. On the other hand, the demand upon the Board of Health to keep the improvement, even if the issue be but a disagreeable odor instead of a positive danger, apace with the increasing sensitiveness of the people.

DUMPING GROUNDS.

The dumping of old paper, ashes and general rubbish, including decomposable matter, continues to cause much annoyance and is everywhere complained of. The question of what can be done to avoid the common dumping ground nuisance, which is to be found in all parts of the city, is now recognized and denounced by all classes as an unmitigated evil, and after many official investigations still remains unsettled. We are not without hope, however, that in the near future some of the many processes of reduction by fire will appear sufficiently economical to be adopted by the city.

QUARANTINE.

No unusual occurrence and no plague, cholera, yellow fever, typhus fever, leprosy or smallpox have been encountered during the year. An average number of cases of diphtheria, scarlet fever and measles has been found, removed to the quarantine hospital for care, as will be seen by the report of the port physician.

Boston, the second immigration port in this country, received 32,659 immigrants in 1908, against 80,241 immigrants in 1907. These immigrants are all inspected at quarantine by the port physician and his assistant, among whom a

small number are found presenting the indications of some undeveloped infectious disease, which may require a few days observation before a decision can be made, and they are detained at Gallop's Island for that purpose. The inspection of incoming vessels, persons and papers at this port are principally made between sunrise and sunset, with night inspection when required, and with such promptness and care as to merit and receive the approval of those who handle the mercantile and commercial interests of the port. The quarantine steamer "Vigilant," used in this service, has been on daily duty for twenty-four years, and must be regarded as an old boat. It would have been in the interest of economy to have replaced her with a new one several years ago. The Board of Health has asked for this exchange twice in the last few years, and will ask for it again when the financial conditions of the city look better.

STABLES.

During the year there were 74 hearings on applications for the occupancy of stables. Of this number 60 were granted, 9 refused, and 5 withdrawn.

APPOINTMENTS.

May 4, 1908. The Board organized by the choice of Samuel H. Durgin, M. D., as chairman and Charles E. Davis, Jr., as secretary.

April 6, 1908. Dr. William H. Davis was appointed a medical inspector.

August 31, 1908. Frank L. Mott was appointed as chemist in the laboratory, in place of Dr. Frank P. Gallivan, resigned.

October 30, 1908. The resignation of Burt Ransom Rickards as director of the laboratory to accept the position of director of the laboratories of the State Board of Health of Ohio was accepted, to take effect September 30, 1908.

November 2, 1908. Dr. Francis H. Slack was appointed director of the laboratory in place of Mr. Rickards.

November 2. Dr. Burdett L. Arms was appointed assistant director of the laboratory in place of Dr. Slack, promoted.

November 6, 1908. Miss Marion E. Wade, B. S., was appointed chemist in the bacteriological laboratory in place of Dr. Arms, promoted.

SAMUEL H. DURGIN, M. D., *Chairman*.

FREDRIC O. NORTH.

JOHN RITCHIE, JR.

REPORT OF CHIEF MEDICAL INSPECTOR.

To the Board of Health:

I have the honor to submit the following report for the year ending December 31, 1908:

INFECTIOUS DISEASES.

Variola.—No cases were reported.

Diphtheria.—There were three thousand one hundred and ninety-seven (3,197) reported; one thousand seven hundred and sixteen (1,716) of these were cared for at the South Department of the Boston City Hospital and the Haynes Memorial Hospital; 53.68 per cent. There were two hundred and four (204) deaths. Mortality, 6.38 per cent.

Scarlet Fever.—There were two thousand six hundred and ninety-three (2,693) cases reported; one thousand three hundred and seventy (1,370) of these were cared for at the South Department of the Boston City Hospital and the Haynes Memorial Hospital; 50.87 per cent. There were one hundred and four (104) deaths. Mortality, 3.86 per cent.

Measles.—There were five thousand eight hundred and ninety-seven (5,897) cases reported, and one hundred and fifty-one deaths. Mortality, 2.56 per cent.

Typhoid Fever.—There were one thousand five hundred and eighty-nine (1,589) cases reported; eight hundred and forty-nine (849) were cared for at the different hospitals in this city. There were one hundred and fifty-nine (159) deaths. Mortality, 10.01 per cent.

Tuberculosis.—There were two thousand six hundred and thirty-seven (2,637) cases reported. There were one thousand and sixty-eight (1,068) deaths.

Leprosy.—No cases were reported.

During the past year four hundred (400) persons died without a physician in attendance, and were reported to this office. In all cases a personal visit was made, the body examined, and a probable diagnosis made before granting permit for burial. Twenty-five (25) cases were referred to the Medical Examiner for investigation.

Respectfully submitted,

THOMAS B. SHEA, M. D.,
Chief Medical Inspector

REPORT OF DERMATOLOGIST.

BOSTON, December 31, 1908.

To the Board of Health:

GENTLEMEN,—I beg leave to make report of the following cases which I have been requested by your honorable Board to see during the year ending December 31, 1908:

Alopecia Areata	7
Cerebro Spinal Meningitis	29
Chicken-pox	76
Dermatitis	22
Dermatitis Venenata	14
Dermatitis Herpetiformis	1
Eczema	78
Erysipelas	1
Erythema Simplex	21
Erythema Multiforme	5
Favus	23
Herpes Simplex	15
Herpes Zoster	9
Ichthyosis	2
Impetigo Contagiosa	69
Lupus Erythematosus	1
Lupus Vulgaris	2
Measles	13
Pediculosis	35
Pemphigus	1
Pernio	1
Prurigo	2
Psoriasis	15
Purpura	1
Scabies	27
Scarlet Fever	18
Scleroderma	1
Seborrhoea	43
Staphylococcia	25
Syphilis	5
Tinea Trichophytina	64
Tinea Versicolor	3
Urticaria	13
Vitiligo	1
Total	<u>643</u>

FRANCIS J. KEANY.
Dermatologist.

Boston, January 1, 1909.

To the Board of Health:

GENTLEMEN,—I have the honor of submitting the following report:

During the past year 2,690 persons presented themselves at Chardon street for primary vaccination. Five hundred and twenty-nine of these returned for certificates; seven applied for secondary vaccination, to two of whom certificates for successful secondary vaccination were issued. Five hundred and twenty-five certificates were given out in other cases of recent successful vaccination. Total number of certificates, 1,056. It is to be regretted that in every case of scarification the patient cannot be induced to return for a certificate. So far as I have been able to judge, however, success in cases of primary vaccination has been practically invariable.

Daily visits have been made at the Suffolk County Jail. At this institution 2,954 patients were treated and 5,877 visits were made.

Respectfully submitted,

GEORGE A. SARGENT, M. D.

REPORT OF THE PORT PHYSICIAN.

QUARANTINE DEPARTMENT,
CITY OF BOSTON, February 1, 1909.

To the Board of Health:

GENTLEMEN,—I herewith submit the annual report of the Quarantine Department for the year ending January 31, 1909.

During the past year all vessels from foreign ports, with the exception of the British Maritime Provinces, have been inspected; from June 1 to November 1 all vessels from ports south of Virginia have been inspected; vessels from Porto Rico are treated in the same manner as those from southern ports.

The United States quarantine regulations are enforced at this port, with the following additions:

All steerage passengers are required to be vaccinated, either a short time before embarking or during the voyage.

All vessels arriving from ports infected with bubonic plague are disinfected, crews bathed, effects sterilized, temperatures taken and a digital examination of inguinal and cervical glands made. From June 1 to November 1 all vessels from United States ports south of Virginia are inspected.

During the year, 59,439 passengers, 28,311 seaman and 2,341 cattlemen were inspected. The number of persons detained at the quarantine station was 794, the largest in the history of the station. Twenty-four vessels were disinfecting, a slight falling off from previous years. Number of vessels inspected, 787.

The station at Gallop's Island is in good condition. The steamer "Vigilant," while old, has been repaired and does fairly good service.

Dr. William M. Gay is still associated with me.

Respectfully submitted,

PAUL CARSON,
Port Physician.

REPORT OF INSPECTOR OF ANIMALS.

BOSTON, February 1, 1909.

To the Board of Health:

GENTLEMEN,—I have the honor to submit the following report of the contagious diseases among animals, the inspection of animals kept for the production of milk within the city, the inspection of animals and dressed meat at the Brighton Abattoir, and the inspection of provisions, for the year ending January 31, 1908.

ANIMALS KILLED AT ABATTOIR.

Cattle	.	.	.	.	.	.	.	.	.	36,284
Calves	.	.	.	.	.	.	.	.	.	18,102
Sheep	.	.	.	.	.	.	.	.	.	2,311
Swine	.	.	.	.	.	.	.	.	.	50,947
Total	.	.	.	.	.	.	.	.	.	<u>107,644</u>

Table No. 1.

ANIMALS CONDEMNED.

	Number.	Weight. (Pounds.)
Cows.....	165	48,915
Steers.....	1	550
Bull.....	1	350
Calves.....	32	1,081
Sheep.....		
Swine.....	57	8,354
Parts of 100 swine.....		1,619
Parts of animals, including 1,969 livers.....		23,745
Total.....	256	84,614

“Parts of animals” in the above table refer to animals where only a part of the same was condemned, the unmarketable portion being confined to the parts about the local lesion.

Table No. 2.

DISEASES FOUND AMONG ANIMALS AFTER HAVING BEEN KILLED AND DRESSED AT THE ABATTOIR, NECESSITATING THE CONDEMNING OF THE CARCASSES.

DISEASES.	Cattle.	Calves.	Sheep.	Swine.	Total.
Tuberculosis.....	157	.....	.....	29	186
Septicemia.....	5	.....	.....	8	13
Puerperal fever.....	2	.....	.....	.....	2
Cholera.....	.....	.....	.....	20	20
Immatured.....	.....	32	.....	.....	32
Injury.....	3	.....	.....	.....	3
Totals.....	167	32	.....	57	256

Table No. 3.

ANIMALS RECEIVED DEAD FROM THE STOCK YARDS TO BE DRESSED FOR FOOD.

ANIMALS.	Number Received.	Number Condemned.	Weight.
Cows.....	99	15	4,620
Steers.....	2	.....	.....
Bulls.....	2	.....	.....
Totals.....	103	15	4,620

The above table refers to animals arriving at the different stock yards which were unable to walk to the abattoir because of injury during transportation, or from what was supposed to be a slight illness; these were shot at the stock yards and carted to the abattoir in the ambulance.

Of the above, 103 animals, 58 were found to be slightly injured, 23 had fracture of a leg, 3 were pregnant, 1 had laminitis, 3 were wild, 3 had septicaemia, 2 had puerperal fever, 3 were badly injured and 7 had tuberculosis, the last 15 being condemned.

TUBERCULOSIS.

The following table shows the number of cases of tuberculosis in cattle killed at the abattoir:

Table No. 4.

CLASS OF ANIMALS.	Number Received.	Number Tubercular.
Cows from Eastern States.....	14,426	394
Bulls from Eastern States.....	1,095	2
Cows from Western States.....	14,849	27
Steers from Western States.....	5,914	.....
Steers from Eastern States.....	.....	1
Swine.....	50,947	123
Total.....	87,231	547

Under the head of "Cows from Eastern States" is included animals from all of the New England States.

INSPECTION OF CATTLE.

The inspection of cattle kept for the production of milk within the city limits has been continued as heretofore. All cattle that have, upon physical examination, shown any symptoms of tuberculosis have been subjected to the tuberculin test. Two animals were found tuberculous, quarantined, and reported to the State Cattle Bureau as required by the Revised Laws. The barns occupied by these animals were disinfected by the Board of Health.

Two cases of actinomycosis were found. These cows were quarantined, the sale of milk prohibited, and reported to the State Cattle Bureau. By order of the State Cattle Bureau these two cows were released. The owners were prohibited from selling the milk of these cows.

GLANDERS.

There have been reported to the Board of Health by veterinarians during the past year 453 horses suspected of having glanders. Of these 116 horses on examination were found to be affected with some non-contagious disease, and the remaining with glanders. Fourteen of these cases upon inquiry were found to have been owned and stabled outside of Boston, or had been stabled in Boston for so short a time that no doubt existed but that the animals were infected with glanders before coming to Boston. The State Cattle Bureau was notified of such cases, that an investigation might be made by them.

The following table shows the number of cases of glanders for each month during the past year.

Table No. 5.

MONTH.	Cases Reported.	Cases Found by Board of Health.	Cases Found which Belonged in some Other City.	Cases which upon Examination were Found not to be Glanders.	Actual Number of Cases of Glanders Found in City.	Number of Cases of Glanders which Belong in Boston.	Number of Stables in which Glanders was Found.
January.....	41	4	.....	11	34	34	29
February.....	34	4	1	9	29	28	27
March.....	59	4	2	8	55	53	37
April.....	42	.....	1	12	30	29	29
May.....	34	3	3	8	29	26	18
June.....	31	1	2	7	25	23	21
July.....	32	.....	.....	8	24	24	21
August.....	36	.....	.....	12	24	24	23
September.....	48	.....	2	16	32	30	33
October.....	45	2	1	15	32	31	32
November.....	28	.....	1	4	24	23	25
December.....	23	1	1	6	18	17	15
Total.....	453	19	14	116	356	342	308

All stables in which glanders occurred during the past year have been disinfected.

RABIES.

During the year ending December 31, 1908, 165 animals suspected of having rabies, or which had been exposed to another rabid animal, came under the observation of this department. Upon investigation 57 were found to be cases of rabies, the diagnosis of which was confirmed by either well marked clinical symptoms or by examination at the bacteriological laboratory. One hundred and seven were found not to be rabid. Forty-one animals which had been exposed to rabid dogs were ordered quarantined until all danger had passed.

The following table shows the result of all cases under observation:

	Total.	Positive.	Negative.	Killed by owner.
Reported as rabid.....	124	54	70	
Quarantined because of exposure.....	41	3	18	20
Total under observation.....	165	57	88	20

INSPECTION OF PROVISIONS.

The following articles of food seized in markets and stores have been condemned.

Beef, tainted	2,595 pounds
Veal, tainted	2,151 "
Veal, immatured	5,277 "
Mutton, tainted	246 "
Pork, tainted	1,562 "
Poultry, tainted	14,658 "
Venison, tainted	90 "
Rabbits, tainted	284 "
Pigeons, tainted	20 "
Eggs, decayed	29 dozen
Miscellaneous fish, decayed	2,297 pounds
Lobster meat, decayed	62 "
Oysters, decayed	150 gallons
Miscellaneous vegetables, decayed	348 bushels
Miscellaneous fruit, decayed	322 "
Spaghetti, decayed	106 boxes
Mixed candies, decayed	910 pounds
Figs, decayed	20 "

Respectfully submitted,

ALEXANDER BURR,
Veterinary Medical Inspector.

REPORT OF THE DIRECTOR OF THE BACTERIOLOGICAL LABORATORY.

To the Board of Health:

GENTLEMEN,—We have the honor to submit the following report for the year ending January 31, 1909:

CHANGES IN STAFF.

B. R. Rickards, S. B., resigned as director of the laboratory December 1, 1908, having been appointed chief of laboratories of the Ohio State Board of Health. His connection with this laboratory dates back eight years, of which he served as director for three. The confidence and esteem with which he was regarded by the physicians of the city is evidenced by the fact that during the time he was director the number of examinations made in the laboratory increased from 18,321 in 1905 to 29,056 in 1908. By promotion Dr. F. H. Slack became director and Dr. B. L. Arms assistant director. E. Marion Wade, S. B., was appointed bacteriologist. Arthur Holston was appointed messenger.

TOTAL ROUTINE EXAMINATIONS.

The total number of routine bacteriological examinations made during the year was 29,056. Of these 23,213 were diagnoses and 5,843 were milk examinations.

PART I.—ROUTINE BACTERIOLOGICAL EXAMINATIONS, DIPHTHERIA.

Table No. I.

SHOWING CULTURES CLASSIFIED.

	Positive.	Negative.	No Growth.	Total.
Primary.....	1,771	7,389	75	9,235
Secondary.....	1,487	3,646	59	5,192
Total.....	3,258	11,035	134	14,427
	22½%	76½%	1%	

The total number of diphtheria examinations increased 1,141 over the number made during 1907, and there was an increase of 463 in the number of primary positives.



Table No. II.
SHOWING CASES CLASSIFIED.

	POSITIVE.		NEGATIVE.		NO GROWTH.	TOTAL.		TOTAL.			Grand Total.
	For Diagnosis.	For Release Only.	For Diagnosis.	For Release.	For Diagnosis Only.	For Diagnosis.	For Release Only.	Positive.	Negative.	No Growth.	
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	
1908.											
February...	100	6	599	17	4	703	23	106	616	4	726
March.....	144	6	706	41	10	860	47	150	747	10	907
April.....	141	8	637	12	5	783	20	149	649	5	803
May.....	143	5	613	25	6	762	30	148	638	6	792
June.....	121	4	339	17	4	464	21	125	356	4	485
July.....	112	1	320	15	3	435	16	113	335	3	451
August.....	91	7	234	31	6	331	38	98	265	6	369
September..	122	5	360	18	5	487	23	127	378	5	510
October....	231	15	552	41	3	786	56	246	593	3	842
November...	214	14	820	51	12	1,046	65	228	871	12	1,111
December...	209	14	854	41	6	1,069	55	223	895	6	1,124
1909.											
January....	185	11	872	36	7	1,064	47	196	908	7	1,111
	1,813	96	6,906	345	71	8,790	441	1,909	7,251	71	9,231

Column 1 shows the whole number of persons proving positive for diagnosis. In some of these cases the first culture was negative, but subsequent cultures for diagnosis were positive. Column 2 shows the total persons positive for release only, no culture (or in very few cases a negative culture) being taken for diagnosis. Column 3 shows cases negative throughout for diagnosis. A few of these were reported by the physicians as diphtheria, in spite of the negative cultures, but these proved negative for release also. Column 5 shows cases on which none but no growth cultures were received.

Table No. III.

SHOWING COMPARISON OF WORK DONE IN DIFFERENT YEARS.

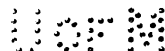
Actual Number of Cultures and Persons Examined.

FEB. 1 TO FEB. 1.	CULTURES.				PERSONS.				Cases Reported.
	Per Month.	For Diagnosis.	For Release.	Total.	Per Month.	Positive Diagnosis.	Negative Diagnosis.	Total Released.	
	1	2	3	4	5	6	7	8	
1898 (estimated)...	440	2,059	3,205	5,264	190	400	1,500	550	1,661
1899.....	660	4,408	3,522	7,930	380	1,019	2,920	1,002	2,836
1900 (approx.)...	1,560	8,000	10,889	18,889	700	2,100	5,600	2,000	5,020
1901.....	944	6,689	4,615	11,304	544	1,176	4,679	1,249	2,906
1902.....	660	5,506	2,223	7,729	438	726	4,140	781	1,881
1903.....	732	5,659	3,122	8,780	464	922	4,149	892	2,166
1904.....	770	5,986	3,251	9,237	479	1,047	4,219	985	2,440
1905.....	631	5,167	2,164	7,331	405	688	3,781	579	1,554
1906.....	1,005	7,817	4,244	12,061	564	1,371	4,953	933	2,266
1907.....	1,107	8,297	4,989	13,286	611	1,360	5,603	932	2,366
1908.....	1,202	10,108	4,319	14,427	769	1,813	6,906	1,156	3,197

Relative Number of Cultures and Persons Examined. (Calculated per 100 Cases Reported.)

1898.....	320	120	192	320	137	24	90	33	1,661
1899.....	280	155	124	280	160	36	103	35	2,836
1900.....	370	159	216	370	167	42	111	39	5,020
1901.....	380	230	158	380	224	40	161	42	2,906
1902.....	411	292	112	411	279	38	220	41	1,881
1903.....	405	261	144	405	257	42	191	41	2,166
1904.....	378	245	133	378	236	43	173	40	2,440
1905.....	471	332	139	471	313	44	243	37	1,554
1906.....	532	345	187	532	299	61	218	41	2,266
1907.....	562	351	211	562	310	57	237	39	2,366
1908.....	451	316	135	451	289	56	216	36	3,197

For every 100 cases reported the laboratory made 451 examinations, 316 being for diagnosis and 135 for release. Cultures from 769 different persons were examined on the average each month, this being 289 for every 100 cases



reported. It would appear that 56 out of every 100 cases reported were diagnosed by the laboratory (see column 6).

While 831 more cases were reported to the Board this year, the percentage diagnosed by the laboratory remains practically the same as last year.

The total number of cultures submitted for diagnosis exceeds that of any previous year by nearly 2,000.

Table No. IV.

SHOWING AVERAGE LENGTH IN DAYS AND WEEKS FROM DATE OF FIRST POSITIVE TO SECOND NEGATIVE.

MONTH.	Number of Cases.	Average in Days.	Number Cases Running Less than One Week.	Number Cases Running Between One and Two Weeks.	Number Cases Running Between Two and Three Weeks.	Number Cases Running more than Three Weeks.
February, 1908.....	48	14.3	8	16	17	7
March.....	60	15.4	6	29	12	13
April.....	53	14.3	3	30	14	6
May.....	50	11.5	7	30	9	4
June.....	53	13.6	8	32	7	6
July.....	35	9.6	8	23	3	1
August.....	18	9.9	4	11	3	0
September.....	40	12.4	5	20	13	2
October.....	112	14.1	15	51	28	18
November.....	95	13.9	13	42	26	14
December.....	88	14.4	7	51	15	15
January, 1909.....	81	14.9	8	36	21	16
Total.....	733	13.7	92	371	168	102
			12%	51%	23%	14%

This table is necessarily based on those cases where cultures were submitted to the laboratory for diagnosis, the patient being also released later on by the laboratory. A large number of positive cases are removed to the City Hospital, and, being finally released from there, cannot be brought into this account.

The average duration of diphtheria cases this year was but 13.7 days, being the lowest average of which we have record. Sixty-eight cases ran three to four weeks; 28 cases ran four to five weeks. There were 10 cases running over five weeks, the longest in duration being 52 days.

Twenty-three virulence tests were made by request, of which 13 were positive and 10 negative.

RECEIVED

Table No. V.

SHOWING NEGATIVE CULTURES OBTAINED FOR RELEASE, INCLUDING PREMATURE NEGATIVES. ALL WERE RELEASED BY TWO CONSECUTIVE NEGATIVES.

MONTH.	Positive Cases Released on Two Negatives.	Positive Cases Showing Premature Negatives.	Per Cent of Positive Cases Showing Premature Negatives.
February, 1908.....	51	8	15
March.....	67	9	13
April.....	57	9	15
May.....	54	7	13
June.....	59	9	15
July.....	37	3	8
August.....	22	1	5
September.....	43	8	19
October.....	127	30	24
November.....	106	22	21
December.....	97	15	15
January, 1909.....	91	24	26
Totals.....	811	145	18%

Column 1 shows total positive cases which were released by two consecutive negatives. Column 2 shows the number of these which, during the taking of cultures for release, yielded a negative culture followed by a positive.

Column 3 shows that if release were granted on one negative culture only, 18 per cent of the total positive cases released by the laboratory would still carry the bacilli after such release. Percentage has fallen from 34 per cent in 1900 to 18 per cent in 1908.

Table No. VI.

COMPARATIVE RESULTS FROM SWAB EXAMINATION AND FIVE-HOUR AND OVER-NIGHT INCUBATION RESULTS.

A.

Swab Examinations and Over-night Incubations.

	Positive Cases.	Negative Cases.
Swab+ Culture+.....	97	0
Swab? Culture+.....	31	0
Swab— Culture+.....	33	0
Swab— Culture—.....	5	439
Swab? Culture—.....	3	36
Swab+ Culture—.....	1	0
	170	475

1908

B.

Five-hour and Over-night Incubations.

	Positive Cases.	Negative Cases.
5-hour+ 20-hour+	102	0
5-hour? 20-hour+	12	0
5-hour— 20-hour+	20	0
5-hour— 20-hour—	1	596
5-hour? 20-hour—	1	16
5-hour+ 20-hour—	0	0
	137	612

Out of 645 swabs examined, 536 or 83.1 per cent were reported as the culture proved; of the remaining 109, 31 were reported suspicious and came positive, bringing the total of reliable reports from swabs up to 87.9 per cent. In one case the swab was positive and the culture negative, here the swab having been introduced into the throat a second time for material for the examination may have reached organisms not touched in the first swabbing.

Of the 749, five-hour examinations made, 698 or 93.1 per cent were reported as the culture proved, the incubation in these cases being necessarily five hours longer than ordinary. Twelve were reported suspicious and came positive, bringing the total of correct reports up to 95 per cent.

The remaining 12 per cent of swabs and 5 per cent of five-hour examinations being negative when the examination was made, were reported tentatively, the full incubation being awaited in any case before a final *negative* report was given.

THE RESULT OF REINCUBATION AND REINOCULATION OF ATYPICAL DIPHTHERIA CULTURES.*

The diphtheria diagnostician recognizes the fact that in his work he meets with a small and fairly constant percentage of cultures for diagnosis showing only irregular or atypical forms, which cannot honestly be reported as either positive or negative. There are of course many cultures which would be considered doubtful by a person unskilled in diagnostic work which by the skilled diagnostician would be readily relegated to either the positive or negative class, these are not

* Read at A. P. H. A. meeting, Winnipeg, 1908. (Revised and brought to date.)

considered here, but we have special reference to what might be called the border line cultures, containing suspicious forms only, which from peculiarities of morphology grouping or staining indicate the presence of the Klebs Loeffler bacillus.

It is urged by some that the diagnostician always gives either a positive or negative report on cultures submitted for examination and in some ways it might be advantageous to be able to do this, but the laboratory expert who wishes to gain and keep the confidence of the community will best do so by giving honest reports.

It has been the custom of this laboratory to report such cultures to the physicians as "suspicious," and request that other cultures be submitted.

The average practitioner, receiving such a report, quickly submits the requested second culture, isolates the patient, if this has not been already done, and gives antitoxin. The patient and his family have the advantage then, if the case is positive, of as complete protective treatment as if the first culture had been reported positive, while if the case proves negative he is saved the disadvantage of having been sent unnecessarily to the contagious hospital.

It is of great advantage to physicians in these cases where the diagnosis is delayed to obtain as early a return as possible from the cultures submitted, and if by further work with the primary cultures a quicker report can be sent, this is desirable.

Attention has previously been called to the fact that longer incubation or reinoculation sometimes throws new light upon atypical cultures, and that while, as a usual thing, fifteen hours incubation is sufficient for demonstration of *B. diphtheriæ* if present, there are occasional cultures possibly containing antagonistic forms of bacteria for which longer incubation is to be preferred.

The results of reincubation and reinoculation of 288 such cultures encountered in our routine work from February 1, 1908, to February 1, 1909, are here presented. During this period reports were given on 14,427 cultures, 10,747 being reported negative, 3,258 positive, 288 suspicious and 134 no growth. These suspicious cultures received the usual fifteen-hour incubation. After being examined and reported "suspicious" the original tube and a transplant on fresh serum were placed in the incubator between 10 a. m. and noon, excepting on Saturdays, Sundays and holidays, when cultures were not returned to the incubator until the routine cultures went in at 6 p. m.

Those cultures which were placed in the incubator before noon were examined at 5 p. m. and all cultures were examined at nine o'clock the following morning.

Of the 288 cultures 126 cases proved to be positive either from these or subsequent cultures, no subsequent cultures were received on 22 of this number, the greater part of which were sent to the contagious hospital at once on account of clinical symptoms and the "suspicious" report.

Of the 162 which were not proven positive culturally no subsequent cultures were sent from 62 cases, a part going to the contagious hospital, others clearing up so rapidly that another culture was not considered necessary by the attending physician.

Table No. 1.

SUMMARY OF REINCUBATION AND REINOCULATION IN POSITIVE CASES, COMPARING THE ORIGINAL TUBE WITH THE ONE INOCULATED FROM IT AND THE SUBSEQUENT CULTURE WHEN ONE WAS RECEIVED.

Reincubation of original culture was positive at 5 p. m. in 14 instances.

Reinoculation from original culture was positive at 5 p. m. in 11 instances.

Reincubation of original culture was positive following a. m. in * 60 instances.

Reinoculation from original culture was positive following a. m. in † 50 instances.

Subsequent culture positive in 88 instances.

Table No. II.

Reincubation was positive and reinoculation negative in * 24 cases.

Reincubation was negative and reinoculation positive in 13 cases.

Both were positive in 37 cases.

Both were negative in 50 cases.

Table No. III.

Reincubation or reinoculation or both positive; subsequent negative, 18.

Reincubation or reinoculation or both positive; subsequent positive, 36.

Reincubation or reinoculation or both positive; no subsequent, 22.

Reincubation and reinoculation negative; subsequent positive, 50.

CONCLUSIONS.

1. These findings demonstrate conclusively the value of further work with atypical cultures.

2. As from the 288 cases 126 came positive while 100 were proven negative, the chance of error, had a positive or negative result been reported at the end of the fifteen-hour examination, would have been great.

3. Both reincubation and reinoculation tests should be made as in a fair percentage of the cases but one of these cultures proved to be positive.

4. As in many instances a positive result was obtained after but five to seven hours additional incubation, it is an

* Apparent discrepancy is not a real one, as in a few instances original tube was positive at 5 p. m. but negative in the morning, having been completely overgrown.

† No 5 p. m. examination made on 15 of above.

advantage to make the five o'clock examination that the physician may have his report at the earliest possible moment.

5. It would appear that typical diphtheria bacilli may be so overgrown at the end of the ordinary fifteen-hour incubation as to practically disappear, the few remaining forms being atypical, this same culture or a transplant giving abundant typical forms on further incubation.

6. The diphtheria diagnostician must recognize in dealing with cultures for diagnosis that the associated organisms may be either symbiotic, neutral or antagonistic, and that while in a large percentage of the cases the diphtheria bacillus may be relied upon to outgrow the other organisms in fifteen hours incubation, there are a small number in which the associated organisms obscure the result at this time, the diphtheria bacillus appearing in large numbers either on shorter or longer incubation periods, depending on the nature of the growth of these organisms.

TUBERCULOSIS.

Table No. I.

MONTHLY TOTALS OF EXAMINATIONS.

MONTH.	Positive.	Negative.	Total.
February, 1908.....	97	317	414
March.....	109	365	474
April.....	93	362	455
May.....	94	356	450
June.....	74	289	363
July.....	75	203	278
August.....	69	197	266
September.....	77	270	347
October.....	96	353	449
November.....	96	343	439
December.....	98	333	431
January, 1909.....	100	430	530
Total.....	1,078 22%	3,818 78%	4,896

For several years these examinations have been increasing at the rate of about 500 a year; this year's record exceeds last year's by but 128, probably because of the fact that examinations are being made by the Out-Patient Department

of the Consumptives' Hospital. On request we have furnished this department with over 1,200 outfits for use in their work.

Table No. II.

SHOWING CASES CLASSIFIED.

Positive.	Negative.	Total.
991	3,299	4,290
23%	77%	

Table No. III.

SHOWING RESULTS OF PUS AND GENITO-URINARY TUBERCULOSIS TESTS.

Positive.	Negative.	Unsatisfactory.	Total.
12	40	3	55
21.8%	72.7%	5.5%	100%

The results recorded in this table are from animal inoculation tests, microscopic examination alone being considered unsatisfactory.

TYPHOID.

Table No. I.

MONTHLY TOTALS OF WIDAL REACTIONS.

MONTH.	Positive.	Negative.	Atypical.	Totals.
February, 1908.....	18	66	1	85
March.....	6	76	7	89
April.....	174	365	37	576
May.....	42	245	9	296
June.....	25	138	13	176
July.....	45	146	13	204
August.....	38	154	11	203
September.....	58	210	15	283
October.....	48	212	7	267
November.....	31	125	5	161
December.....	49	124	13	186
January, 1909.....	25	125	4	154
Total.....	559	1,986	135	2,680
	21%	74%	5%	

Table No. II.
SHOWING CASES CLASSIFIED.

Positive.	Negative.	Unsatisfactory.	Total.
516	1,688	61	2,265
23%	74%	3%	

The great increase in the number of typhoid examinations this year is due to the outbreak from infected milk in the Jamaica Plain district.

Besides the regular tests above tabulated, thirty-two Conradi tests have been carried through.

Outfits for these blood cultures may be obtained at the laboratory by any physician, and the test may prove of great value during the first week of the disease, before the Widal reaction could be obtained.

Thirty-three urines and fourteen specimens of fæces have also been examined for the presence of the typhoid bacillus.

MALARIA.

Positive.	Negative.	Unsatisfactory.	Total.
34	191	1	226
15%	85%		

More examinations for malarial parasites were made this year than any previous year in the history of the laboratory and there were twice as many positives as in any other year.

GONORRHOEAL OPHTHALMIA.

The Legislature of 1905 made it obligatory on the part of the attending physician or nurse to report to the Board of Health any case of eye inflammation occurring within two weeks after birth. The laboratory is prepared to examine smears from any case of suspected gonorrhœal ophthalmia. Outfits for taking the smears may be obtained from any culture station.

Ophthalmia.

Positive.	Negative.	Unsatisfactory.	Total.
21	82	1	104
20%	79%	1%	

GONORRHOEAL URETHRITIS.

Aside from these examinations of eye smears for gonococci the laboratory is being called upon to make a large number of examinations for gonorrhoeal urethritis. Examinations for 1908 tabulate as follows:

Gonorrhoeal Urethritis.

Positive.	Negative.	Unsatisfactory.	Total.
103	143	28	274
38%	52%	10%	

RABIES.

Collection of Specimens.—Dogs or other animals having symptoms of rabies should not be killed, but should be confined securely and notification sent to the veterinarian of the Board of Health. If the suspected animal dies his whole carcass should be preserved and notification sent as above. Failing this, the head at least should be preserved for examination.

Examination.—Impression smears are first made from portions of the Ammon's horn. If these prove positive further tests are unnecessary, and a report can be forwarded at once, often in from fifteen minutes to one-half hour after the brain is removed. If the impression smears show no Negri bodies, portions of the Ammon's horn and cerebellum are hardened, imbedded in paraffin and sectioned. An examination of sections from the Gasserian ganglia for pathological changes is of value, but not absolutely diagnostic of rabies. If these sections prove negative guinea pigs are inoculated under the dura with an emulsion of portions of the brain and cord.

In the latter case, if positive, it is usually from ten days to two weeks before symptoms are noted, and they may be delayed for a much longer period of time.

Rabies.

SHOWING CASES CLASSIFIED.

Positive.	Negative.	Unsatisfactory.	Total.
32	28	2	62
51.4%	45.4%	3.2%	

GLANDERS.

Table No. I.

SPECIMENS EXAMINED FOR YEAR ENDING JANUARY 31, 1908.

MONTH.	Positive.	Negative.	Unsatisfactory.	Total.
February, 1908	9	8	2	19
March	11	11	8	30
April	6	10	4	20
May	9	12	4	25
June	10	10	1	21
July	5	7	4	16
August	8	12	3	23
September	6	12	6	24
October	8	15	4	27
November	6	5	2	13
December	5	14	2	21
January, 1909	8	14	4	26
Totals	91 34½%	130 49%	44 16½%	265

More tests for glanders were made this year than in any previous year. The laboratory also manufactures and furnishes free to veterinary physicians mallein put up in 2 cubic cm. doses. Many hundreds of doses of this valuable diagnostic agent were distributed during 1908.

Table No. II.

SHOWING CASES CLASSIFIED ON GUINEA PIG TESTS.

	Positive.	Negative.	Unsatisfactory.	Total.
For year ending January 31, 1909...	84 38.4%	102 46.5%	33 15.1%	219 100%

OTHER EXAMINATIONS.

Miscellaneous Examinations.

Positive.	Negative.	Total.
38	185	223

Special examinations included under this heading are examinations of blood, urine and fæces for typhoid bacilli. blood specimens for paratyphoid organisms, diphtheria virulence tests, microscopical examination of pus for tubercle bacilli, examinations for organisms causing influenza, pneumonia, syphilis, plague, actinomycosis, conjunctivitis, etc.

Table Summarizing Routine Examinations for Year Ending January 31, 1908.

MONTH.	Diphtheria.	Tuberculosis (Sputum).	Typhoid.	Malaria.	Ophthalmia.	Gonorrhoea, other than Ophthalmia.	Glanders.	Rabies.	Tuberculosis, Urines, Pus, Etc.	Other Discharges.	Total.	Milk Examinations.	Grand Total.
February, 1908.....	1,053	414	85	6	8	13	19	2	8	17	1,625	555	2,180
March.....	1,294	474	89	9	11	19	30	1	9	11	1,947	558	2,505
April.....	1,187	455	576	10	8	14	20	3	6	21	2,300	471	2,771
May.....	1,190	450	296	15	4	17	25	5	3	47	2,052	208	2,260
June.....	779	363	176	18	4	18	21	3	2	12	1,399	571	1,970
July.....	722	278	204	16	4	21	16	4	6	6	1,273	264	1,537
August.....	539	266	203	24	16	8	23	2	2	9	1,092	325	1,417
September.....	734	347	283	38	11	24	24	1	2	15	1,479	389	1,868
October.....	1,364	449	267	32	8	37	27	11	6	15	2,216	759	2,975
November.....	1,877	431	161	22	3	29	13	6	5	16	2,571	495	3,066
December.....	1,830	431	186	20	17	42	21	14	6	21	2,578	667	3,245
January, 1909.....	1,858	530	154	17	17	32	26	10	4	33	2,681	581	3,262
Total.....	14,427	4,896	2,680	227	104	274	265	62	55	223	23,213	5,843	29,056

Table Summarizing Routine Examinations for Eleven Years Ending January 31, 1909.

YEAR.	Diphtheria.	Tuberculosis.	Typhoid.	Glanders.	Malaria.	Ophthalmia.	Other Gonorrhoeal Examinations.*	Rabies.	Tuberculosis, Urines, Pus, Etc.*	Other Examinations.	Milk Examinations.	Total.	Average Per Day.
1898-99 (9 months).....	3,948	.....	122	.....	.....	.....	.....	3	.....	.....	.....	4,073	15
1899-1900.....	7,930	.....	483	65	19	.....	.....	2	.....	27	.....	8,526	24
1900-1901.....	18,889	1,021	1,014	119	38	.....	.....	.....	.....	44	.....	21,125	57
1901-1902.....	11,304	1,957	1,049	158	85	.....	.....	.....	.....	52	.....	14,605	40
1902-1903.....	7,729	2,322	984	140	98	.....	.....	.....	.....	32	.....	11,305	31
1903-1904.....	8,780	2,914	1,088	175	98	.....	.....	.....	.....	45	.....	13,101	36
1904-1905.....	9,237	3,115	1,164	147	134	.....	.....	3	.....	88	3,468	17,356	47
1905-1906.....	7,331	3,650	1,281	174	182	40	.....	1	.....	103	5,559	18,321	50
1906-1907.....	12,061	4,255	1,630	258	191	69	.....	47	.....	334	5,005	23,850	65
1907-1908.....	13,286	4,768	1,510	208	180	71	.....	54	.....	390	4,681	25,148	69
1908-1909.....	14,427	4,896	2,680	265	227	104	274	62	55	223	5,843	29,056	80
Total.....	114,922	28,898	13,005	1,709	1,252	284	274	173	55	1,338	24,556	186,466	46

* Included in other examinations previous to this year's report.

During 1900-01, when diphtheria was especially prevalent, the number of examinations made by the laboratory increased enormously, falling back in 1902 to what might be considered a normal increase. From 1902 on the number of examinations has steadily increased in all the tests made by the laboratory, rising this year to a grand total of 29,056, or about eighty tests a day.

In connection with the above table it should be noted that the laboratory force has not been increased in proportion to the increase of work.

The director of the laboratory wishes to state his appreciation of the loyalty and devotion of his fellow workers on the diagnostic staff who, without extra compensation, have daily, including Sundays and holidays, worked overtime in order that the laboratory might meet the demands made upon it.

The constant increase in the number of tests has made additions to the staff imperative.

In work as exacting as this sufficient assistance should be provided that too great a strain may not be placed on anyone.

NUMBER OF PHYSICIANS WHO MAKE USE OF THE LABORATORY.

During the past year examinations have been made for 1,239 physicians.

Diphtheria examinations were made for	945
Sputum examinations were made for	645
Bloods for typhoid for	511
Bloods for malaria for	103
Urethral pus for gonococci for	58
Pus from eyes for gonococci for	46
Miscellaneous examinations for	107

Some physicians, of course, sent material to be examined under several of the above classifications; the number of examinations for a single physician (exclusive of those sending from an institution) varied from 1 to 677.

PART II. — BACTERIOLOGICAL EXAMINATION OF MILK.

During the year bacteriological examinations of 5,843 milk samples have been made, this being the largest number examined in any one year since this work was started in 1904.

Total number of samples examined	5,843	
Number of samples showing over 500,000 bacteria per cubic centimeter	1,058	18%
Number of samples passed by microscopic method alone	3,536	60%
Number of samples showing presence of pus*	97	1.66%
Number of samples showing presence of streptococci	8	.13%
Number of samples showing both streptococci and pus	2	

Table Showing Bacterial Contents of Milk as Seized from Various Sources During the Year 1908.†

WHERE OBTAINED.	Number of Samples.	Count Above 500,000 to a Cubic Centimeter.
Contractors.....	4,189	12.75%
Wagons.....	1,197	30.32%
Stores.....	282	52.83%
Unclassified.....	175	6.85%

For sake of comparison we reproduce last year's figures (1907):

WHERE OBTAINED.	Number of Samples.	Count Above 500,000 to a Cubic Centimeter.
Contractors.....	2,947	17%
Wagons.....	978	39%
Stores.....	643	59%
Unclassified.....	113	31%

The marked improvement in the purity of the milk supply as shown by these two tables is most gratifying, proving conclusively the value of the bacteriological inspection. The results this year are more remarkable when it is considered that for several months counts have been made after forty-eight hours incubation at 37 degrees centigrade according to the recommendations of the Committee on Bacterial Milk Analysis of the American Public Health Association, instead of but 24 hours as was previously the custom.

* Counting out 28 samples taken especially for verification of previous pus findings.

† The collection of bacteriological milk samples and enforcement of the bacteriological milk regulations are under the charge of Mr. James O. Jordan, Inspector of Milk, into whose hands have been placed daily (card catalogue) and monthly reports showing the results of the above work in detail.

PART III. — SPECIAL INVESTIGATIONS.

The following investigations, inspections and analysis have been made at the request of the Board.

LONGEVITY OF B. TUBERCULOSIS IN SPUTUM.*

B. R. Rickards, F. H. Slack and B. L. Arms.

Authorities on tuberculosis are practically unanimous in ascribing the greater part of the spread of this disease to infection with organisms from the sputum of individuals suffering from pulmonary tuberculosis.

Comparatively little work has been done to determine how long tubercle bacilli will retain vitality and remain virulent in the sputum under varying conditions.

Dr. Anna I. Von Sholley reports a series of experiments on 36 pigs.† Dr. John Weinzirl gives an interesting report on work with cultures alone.‡

Acting under the suggestion of Dr. Durgin, and with the authority of the Boston Board of Health, this laboratory began a series of experiments June 25, 1907.

That these experiments might approximate as closely as possible actual conditions, four rooms were obtained in the tenement house districts—No. 1, dry and sunny; No. 2, dry, well lighted, but with no sunshine, the exposure being to the north; No. 3, dark and dry, lighted by window from air-shaft and window between this and No. 2; No. 4, dark and damp (a basement).

These rooms had, of course, to be kept locked, but screened windows were left open in order to obtain circulation of air.

Owing to the difficulty of procuring suitable rooms but two were ready June 25, Nos. 2 and 3, experiments being started in Nos. 1 and 4 on July 9.

Technique.—Pieces of wooden tongue depressors (representing woodwork) and woolen carpet (representing carpet or rugs) about $1\frac{1}{2}$ inches by $\frac{1}{2}$ inch were immersed over night in a jar of mixed tubercular sputum obtained from one of the city institutions, a separate sample being obtained for rooms 1 and 4. Controls on both were positive.

The pieces of carpet were simply laid on the floors of the rooms, but the pieces of wood were held up by string supports so that both sides might be exposed. The samples were collected in sterile test tubes, care being taken to flame

* Read at A. P. H. A. meeting, Winnipeg, 1908 (additional experiments included).

† Report of the Health Department of the City of New York, 1905, Vol. 2, page 683.

‡ Transactions A. P. H. A., Vol. 32, Part 2, page 128.

the collecting forceps in alcohol that no tubercle bacilli might be carried from one sample to another.

On arrival of the sample at the laboratory about three cubic centimeters of sterile water was added to it, and it was allowed to stand four to five hours. It was then thoroughly rubbed up, and about one cubic centimeter of the suspension thus obtained, injected subcutaneously into a guinea pig, all tests being made by animal inoculations.

No test was considered positive unless (a) organisms were demonstrated from the lesions, or (b) typical pathological lesions were demonstrated microscopically (in a few instances usually occurring when the pig died; having been inoculated but three or four weeks, it was necessary to make sections from the liver or the spleen).

First Experiments.—Collections and inoculations were made each Tuesday and Friday until August 23. No positives were obtained from Rooms 1 and 4. Two positives on wood were obtained from Room 2 three and ten days after seeding; two on wood from Room 3 after ten days and fourteen days exposure.

Owing to the fact that no positives were obtained from Rooms 1 and 4, it was decided to repeat the tests, using the same sputum in all the rooms, but as the day when the rooms were seeded was cloudy, another sputum was obtained for use in the sunshine experiments in Room 1. Mixed sputum was used as in the previous experiments.

Second Experiments.—Rooms 2, 3 and 4 were seeded September 6, and collections made on the 10th, 13th, 16th, daily, to the 28th, 30th, October 2 and 4. Four positives were obtained from Room 2, all being on carpet, after twelve, twenty-one, twenty-four and twenty-eight days' exposure. Three positives were obtained from Room 3, one on carpet after seventeen days, two on wood after ten and nineteen days; four positives from Room 4, three on carpet after four, thirteen and seventeen days; one on wood after four days.

Room 1 (sunlight experiments) was seeded September 26, and collections made hourly for the first day and then discontinued on account of rain. Six collections from each were made, nine being positive and three unsatisfactory, positives being obtained up to the end of the six hours' exposure.

Owing to the difficulty of conducting the experiments, the rooms being located about two miles from the laboratory and at some distance from each other, and to the inconsistency of the results obtained, many negatives being followed by a positive in several instances, it was decided to run a new set

Results of First Set of T. B. Experiments.

DATE OF COLLECTION.	Room 1.		Room 2.		Room 3.		Room 4.		TOTALS.			TOTALS.
	Carpet.	Stick.	Carpet.	Stick.	Carpet.	Stick.	Carpet.	Stick.	Positive.	Negative.	Unsatisfactory.	
June 25.....			Seeded.	Seeded.	Seeded.	Seeded.			1	1	2	4
28.....			—	+	uns.	uns.						4
July 2.....			—	—	—	—			2	3	1	4
5.....			—	+	—	+				2		4
9.....	Seeded.	Seeded.	—	—	—	+	Seeded.	Seeded.	1	3		4
12.....	—	—	—	—	—	—	—	—		6	2	8
16.....	—	—	—	—	—	—	—	—		6	2	8
19.....	—	—	—	—	—	—	—	—		8		8
23.....	—	—	—	—	—	—	—	—		5	3	8
26.....	—	—	—	—	—	—	—	—		7	1	8
30.....	—	—	—	—	—	—	—	—		8		8
August 2.....	—	—	—	—	—	—	—	—		8		8
6.....	—	—	—	—	—	—	—	—		8		8
9.....	—	—	—	—	—	—	—	—		7	1	8
13.....	—	—	—	—	—	—	—	—		8		8
16.....	—	—	—	—	—	—	—	—		8		8
20.....	—	—	—	—	—	—	—	—		8		8
23.....	—	—	—	—	—	—	—	—		7	1	8
	—	—	—	—	—	—	—	—		7	1	8

Uns. unsatisfactory.

— Negative results.

+ Positive results.

Results of Second Set of T. B. Experiments.

DATE OF COLLECTION.	Room 1.		Room 2.		Room 3.		Room 4.		Positive.	Negative.	Unsatisfactory.	Totals.
	Carpet.	Wood.	Carpet.	Wood.	Carpet.	Wood.	Carpet.	Wood.				
September 10.....			—	—	—	—	+	+	2	4		6
13.....			—	—	—	—	uns.	—		5	1	6
16.....			—	—	—	+	uns.	—	1	4	1	6
17.....			—	—	—	uns.	—	—		5	1	6
18.....		uns.	—	—	—	—	—	—		5	1	6
19.....		—	—	—	—	—	+	—	1	5		6
20.....		—	—	—	—	—	—	—		6		6
21.....		—	—	—	—	uns.	—	—		5	1	6
22.....		—	—	—	—	—	—	—		6		6
23.....		—	—	—	+	—	+	—	2	4		6
24.....		—	—	—	—	—	—	—		6		6
25.....		—	—	—	—	—	—	—	1	5		6
26.....	(4+ 2 uns.)	(5+ 1 uns.)	—	—	—	—	—	—	9	6	3	18
27.....		uns.	—	—	—	uns.	—	—		4	2	6
28.....		—	—	—	—	—	uns.	—		5	1	6
30.....		uns.	—	—	—	—	uns.	—		4	2	6
October 2.....		—	—	—	—	—	—	—		6		6
4.....		uns.	—	—	—	—	—	—		5	1	6
									16	90	14	120

+ Positive results.

— Negative results.

Unsatisfactory.

of experiments in the laboratory itself, where the varying factors could be more directly under our control.

The following modifications of technique were used.

1. Sputum obtained from a single individual was used, control inoculations being made long enough in advance of the inoculations to show that we were dealing with a virulent organism.

2. Sputum was thoroughly shaken to obtain uniformity, and a large drop of the mixture thus obtained was placed on each piece of carpet or stick used.

This gives more nearly the condition of sputum as expected, although of course the amount used was much smaller.

Third Experiments (for control). On these experiments two pigs were inoculated December 9, 1907, with sputum from a single patient; one of these controls developed so rapidly that it was possible to demonstrate typical organisms from the inoculation site and inguinal glands by December 20; the other, autopsied at a later date, was also positive.

On December 23 pieces of carpet and stick were seeded with a second sample from this patient.

Part of these were exposed in a box with a glass front and a cloth back, on a high bench behind the microscope bench, the front of the box facing the north windows. These specimens thus obtained abundant diffuse light, but no sunlight, conditions corresponding to Room 2 in the previous experiments.

Others were exposed to the air in a box in a dark stock room, all artificial light excluded by a cloth hung over the front, tacked to the top and sides, conditions corresponding to Room 3. Pigs were inoculated December 26 and thereafter every other day as long as the material exposed lasted.

On the specimens exposed to light and air the following results were obtained:

Carpet, eight positives, covering nineteen days' exposure, one negative being obtained after fifteen days, and all being negative after nineteen days; tests covered fifty-seven days.

Wood, twelve positives, covering thirty-one days' exposure; during this time there were two negatives after twenty-five and twenty-nine days and one unsatisfactory after twenty-one days. No further positives were obtained, although the tests covered a period of seventy days.

On the specimens exposed to the air but kept in the dark results were as follows:

Carpet, seventeen positives; the first sixteen tests made were positive, covering thirty-five days' exposure; no positives were obtained in the next thirty days, when, as a result of "rubbing up" two specimens together and making an

DATE.	Approximat- ing Room 2 Carpet.	Approximat- ing Room 2 Wood.	Approximat- ing Room 2 Carpet.	Approximat- ing Room 3 Wood.	Positive.	Negative.	Unsat- isfactory.	Totals.
December 26.....	+	+	+	+	4			4
December 28.....	+	+	+	+	4			4
December 30.....	+	+	+	+	4			4
January 1.....	+	+	+	+	4			4
3.....	+	+	+	+	4			4
5.....	+	+	+	+	4			4
7.....	+	+	+	+	3	1		4
9.....	+	+	+	+	4			4
11.....	+	+	+	+	4			4
13.....	+	uns.	+	+	2	1	1	4
15.....	+	+	+	+	2			4
17.....	+	+	+	+	2			4
19.....	+	+	+	+	3			4
21.....	+	+	+	+	2			4
23.....	+	+	+	+	2			4
25.....	+	+	+	+	1			4
27.....	+	+	+	+	3			4
29.....	+	+	+	+	3			4
31.....	+	+	+	+	1		1	4
February 2.....	+	+	+	+	1			4
4.....	+	+	+	+	1			4
6.....	+	+	+	+	1			4
8.....	+	+	+	+	1			4
10.....	+	+	+	+	1			4
12.....	+	+	+	+	1			4
14.....	+	+	+	+	1			4
16.....	+	+	+	+	1			4
18.....	+	+	+	+	1			4
20.....	+	+	+	+	1			4
22.....	+	+	+	+	1			4
24.....	+	+	+	+	1			4
26.....	+	+	+	+	2			3
28.....	+	+	+	+	2			3
March 1.....	+	+	+	+	1		1	3
3.....	+	+	+	+	1			3
5.....	+	+	+	+	2			3
7.....	+	+	+	+	2			3
9.....	+	+	+	+	2			3
11.....	+	+	+	+	1			3
13.....	+	+	+	+	1			3
15.....	+	+	+	+	1			3
17.....	+	+	+	+	1			3
19.....	+	+	+	+	1			3
Totals.....	28	35	35	42	77	57	6	140

Uns. unsatisfactory.

- Negative results.

+ Positive results.

inoculation, one positive was obtained. Although this was repeated for the remaining three inoculations no more positives were obtained. The tests covered a period of seventy days.

Wood, forty-two positives; one negative was obtained after seventy-one days' exposure, and there was one unsatisfactory test after thirty-nine days. No end point was reached, positive results being obtained up to eighty-eight days.

SUNSHINE EXPERIMENTS.

Bricks with small amounts (about 1 cubic cm.) of sputum placed on them were exposed on a flat roof where no shade could interfere, with direct exposure to the sun, June 15 at 10 a. m.

There was a high wind all day; between 11 a. m. and 1.40 p. m. the sky was clouded; after that clear until sundown.

During the night there was a hard rain which continued until 10 a. m. June 16, 1908, after which weather was clear to 3.30 p. m.

Specimens were taken June 15, 1908, at 11 a. m., 1.40, 3.20 and 4.20 p. m.; June 16, 1908, at 9.20 a. m., 1.30, 2.30 and 3.30 p. m.

All produced lesions in guinea pigs, with the exception of the specimen taken at 1.30 p. m. June 16, 1908.

On June 22, 1908, at 10 a. m., sputum was similarly exposed on bricks, bits of carpet and wood. Weather clear and sunny all day with a light wind; the following day was hazy until 11 a. m., when clouds shut off all sunlight.

Inoculations were made hourly from 11 a. m. to 6 p. m. the first day, and from 8 a. m. to 12 m. the second day.

	Brick. +	Brick. —	Carpet. +	Carpet. —	Wood. +	Wood. —
June 22, 1908.....	11, 12, 2, 4, 6	1, 3, 5	11, 5	12, 1, 2, 3, 4, 6	11, 12, 3	1, 2, 4, 5, 6
June 23, 1908.....		8, 9, 10, 11, 12		8, 10, 11, 12 Uns. 9 a. m.	Uns. 11 a. m.	8, 9, 10, 12

+ Positive results.

— Negative results.

Uns. unsatisfactory.

On June 30, 1908, 10 a. m., exposed sputum on bricks, carpet and wood; weather fairly clear with moderate wind; clouded over at 1 p. m., and rained for thirty minutes, 2.15-2.45, during which time the specimens were brought inside. They were returned at 2.30, when the sun was shining; clear for the rest of the day.

4. It is also apparent that the so-called "tubercular houses" are a real menace to the health of a community.

Comparison of these series of tests show conclusively the great variability in the longevity of the tubercle bacillus in sputum. Further work along these lines will be carried on as time and space permits.

This important research work on the longevity of the tubercle bacillus had to be discontinued on account of the great increase of routine work. Our animal cages at this time are filled with routine tests and research work has been abandoned for the present owing to lack of time and space.

Examination of Milk, Slime from Milk Separators and of Cow Fæces for B. Tuberculosis.

During March, 1908, at the request of Mr. James O. Jordan, milk inspector, five samples of milk, nine of separator slime and sixteen of fæces were tested by animal inoculation for the presence of tubercle bacilli. Positive results were obtained in three samples of separator slime and four of fæces. This work also, although highly important, was discontinued because of lack of space and time.

DISINFECTION OF BOOKS.*

At the request of the Board experiments were begun in February, with the object of determining what procedure was necessary to successfully disinfect books.

TECHNIQUE OF EXAMINATION.

Public library books, taken from houses where infectious disease was present, were obtained from the disinfecting station and definitely infected with the diphtheria bacillus on five or six different pages in different parts of each book. In some cases the pages were infected with the organisms by dipping a finger into a fairly thin water emulsion of the diphtheria bacillus made by rubbing the growth from a serum culture in the water of condensation, and then placing the finger on the page to be infected, thus simulating as nearly as possible the act of the diphtheria patient in wetting his finger in his mouth and then turning the page. Other pages were infected by painting a portion of the page by means of a brush with a thick water emulsion of bacillus diphtheriæ. In order to see how completely a page was disinfected if the leaves remained close together some pages were infected near the binding.

* Printed in full in the American Journal of Public Hygiene, August, 1908, page 325.

The disinfection experiments with formaldehyde were conducted in an unheated closet used for the purpose in the storage room of the disinfecting station on North Grove street. In all cases the books were exposed to the gas for twenty-four hours, one-half hour to one hour being taken to throw off the gas.

FORMALDEHYDE DISINFECTION.

Four different sets of experiments were tried with 40 per cent formaldehyde as follows:

NUMBER.	Date.	Formalin used.	Humidity, relative.	Temperature of room.	Number books.	Total places infected.	Per cent of good growths.	Per cent inhibited.	Per cent absolute negatives.
1.....	February 11	6 os.	beg. 46 end 55	37-39°F	10	50	54	34	12
2.....	February 17	31½ os.	beg. 87 end 84	43-54	5	30	26.6+	70	3.3+
3.....	February 26	30½ oz.	beg. 68 end 84	44-46	5	30	20	50	30
4.....	April 27	31	beg. 72 end 83	63	5	30	16.6+	56.6+	26+

In the first experiment the humidity was not increased other than by the water contained in the formalin. The room was very cold and the amount of formalin used low. Half the books stood on wooden shelves, with the leaves spread; half were hung with the covers back to back from strings by means of clothespins.

In the second experiment the humidity of the closet was increased by sprinkling the floor and walls thoroughly with a watering pot. Three of the books were hung from strings and two stood on the shelves.

Before the third set of experiments was run, the wooden shelves and strings were removed from the closet and wire shelves of inch mesh substituted with the idea of giving a freer circulation of the gas. The books in this and the subsequent experiment stood on end and wooden wedge-shaped pegs, obtained for the purpose, inserted in the binding to spread the leaves. In this experiment water was boiled off into the closet to the extent of twenty-one ounces.

The fourth set of experiments was undertaken to see if the temperature factor was responsible in any way for the poor results obtained, the previous tests having been performed in the winter time.

From the table it will be seen that the efficiency of the disinfection increased with each set of experiments, both the humidity and temperature factors appearing to influence the result. Neither the position of the books nor the relative part of the book or page infected seemed to have any particular effect on the result,—except that where pages were pasted together good growths were usually obtained.

STEAM DISINFECTION.

After some preliminary experiments with infected books in our small laboratory autoclave, two sets of experiments were undertaken with the large steam sterilizer at the Southampton Street Hospital (the superintendent, Mr. Jamieson, showing us every courtesy).

In the first experiment of this kind five books, infected as before in six different places with *B. diphtheriæ*, were exposed to dry steam under a pressure of fifteen pounds for twenty minutes. A temperature of 250 Fahrenheit was thus obtained. No growths whatsoever were obtained after this experiment, the books apparently being absolutely sterile. The wooden wedges were used in this experiment to keep the books open, the books standing on their edges. In this experiment the bindings were injured owing to the wedges plus the heat applied. Some books were seared by the heat where they came in contact with metal.

A second set of experiments with steam was undertaken on June 8, fifteen to twenty pounds pressure being used. Two books were held open by the wooden wedges which in turn were suspended by strings. In this case the binding fell away from the books during sterilization, but being replaced while still warm and moist suffered no great injury. Two other books were suspended from strings by clamps. In this case the clamps injured the bindings. In all of the above tests the books were found sterile.

Six books inoculated in six different places each (36 tests) were laid flat on a wooden board. In only four cases were diphtheria bacilli recovered and these were very few in number and were incapable of multiplication. It seems probable that in these four instances the organisms were in that part of the book next the board and thus protected to some extent from the penetration of the heat.

Conclusions.

1. Formaldehyde is inefficient as a means of disinfecting books.

2. Steam sterilization of books is rapid and efficient. The books are not materially harmed by the process — despite numerous statements to the contrary in the literature — provided that care is taken to thoroughly warm the apparatus before the insertion of the books, thus preventing much condensation of moisture in the inner chamber. *Dry* steam does practically no damage. By this process the books can lie flat and thus avoid any tension on the bindings, provided that there is not too great a thickness of non-heat-conducting material.

The above applies to cloth bindings only; leather bindings are injured by the steam pressure.

DISINFECTION OF ROOMS.

A few experiments were undertaken during March to test the efficiency of the present methods of room disinfection.

Sufficient work was not done to warrant drawing conclusions. It is hoped that more time may be available to spend on this problem during the coming year.

RESEARCH BY PHYSICIANS NOT CONNECTED WITH THE LABORATORY FORCE.

We have been pleased as opportunity has offered to place the laboratory facilities at the disposal of physicians who were carrying on research investigations of public health problems.

During the past few months it has been our privilege to be of service to three such workers, and thus aid them in their research.

Since December 1 Dr. C. L. Overlander has been continuing in this laboratory the investigation on typhoid carriers, begun at the Boston City Hospital, a preliminary report of which may be found in the January 14, 1909, issue of the "Boston Medical and Surgical Journal."

Dr. Benjamin Tenney is conducting experiments relating to tubercular infection of the kidneys.

Dr. W. P. Boardman has made some slight use of the laboratory in connection with his work on the serum diagnosis of syphilis.

In all such investigative work in the hands of competent men we are willing, so far as our conveniences admit, to be of service.

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TESTS OF "DISINFECTANTS."

"Trinity Disinfectant."

At the request of the Board tests were made of "Trinity Disinfectant, Fumigator, Deodorizer Compound," manufactured by E. H. Doble Company of West Quincy, Mass.

The qualitative chemical analysis of this compound shows the presence of considerable quantities of sodium, chlorides and sulphates. Special tests of an oily liquid separated by a solution of the compound in water indicate the presence of creosote. The percentage of available chlorine present is very small, less than 1 per cent.

Directions accompanying the package are very indefinite as to the quantity to be used. A 10 per cent solution of the compound in water was tested as to its disinfecting properties in our usual manner. Twenty-four hour cultures of diphtheria, pyocyanous and staphylococcus pyogenes aureus were rubbed up with distilled water, and emulsions of these organisms dried on glass rods for one hour. These rods were then immersed for varying periods of time, up to one hour, in the solution to be tested, rinsed in sterile bouillon and inoculated on agar slants, with the exception of the diphtheria, which was inoculated on serum. Abundant growths were obtained on all exposures up to one hour. Glass rods prepared in the same manner were exposed to the fumes of the compound burned on glowing charcoal. Twenty grams of the compound were burned in this way in a closed space of about 50 cubic feet for three hours. The rods were inoculated on agar and serum, good growths being obtained in all cases.

As the letter accompanying the samples spoke of tests on diphtheria bacilli suspended in distilled water, further tests were made with a suspension of diphtheria bacilli in a 10 per cent solution of the compound in distilled water, inoculations being made from time to time on blood serum, and good growths of diphtheria bacilli were obtained even up to one hour's exposure, but no growths were obtained at two hours or three hours. The substance has thus proven to possess very slight disinfectant power.

Tested as a deodorizer, sprinkled dry, as directed on specimens of fæces which had been brought to the laboratory to be tested for typhoid, the compound may be said to have changed the odor to a slight extent, but not to have improved it. Fæces thoroughly mixed with the dry material and allowed to stand two hours gave abundant bacterial growth on inoculation of agar slants.

As a result of these tests we draw the conclusions that the Trinity compound is practically worthless for the purposes it advertises.

Otder tests comparing the efficiency of various coal tar disinfectants were made at the request of the Board, the samples being known to us by number only. A sample of liquid disinfectant, marked "George B. Robbins Company," was also tested as to efficiency. Tests had to be made with full strength of this latter fluid as it was immiscible with water.

EXAMINATION OF WATER FROM POND IN MARINE PARK, SOUTH BOSTON.

At various times during the year samples of water have been collected and examined from this source. Sewage organisms were present as in all our harbor waters, the pond being an artificial one supplied from the harbor. Special tests were made for hydrogen sulphide gas, which was found in considerable quantity in a sample taken February 1. Samples taken in March, June and September showed but a mere trace of this gas.

MISCELLANEOUS TESTS.

In addition to the preceding report special tests were made as follows:

Bacterial examination of seven samples of water of which four showed pollution.

Analyses of several samples of wall paper for arsenic—all negative. Chemical analysis of soda water sample for lead which was found.

Analyses of two samples of formaldehyde for percentage strength.

Analyses of one sample of chloride of lime for available chlorine.

Ptomaine tests on sample of sardines and sample of ham.

Microscopical examination of dust for coal particles.

Chemical examination of coloring matter for identification.

All of which is respectfully submitted.

BURT R. RICKARDS,
Director to December 1, 1908.

FRANCIS H. SLACK,
Director from December 1, 1908.

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REPORT OF MILK INSPECTOR.

BUREAU OF MILK INSPECTION,
30 HUNTINGTON AVENUE, BOSTON, MASS.

To the Board of Health:

GENTLEMEN,—I have the honor to submit the following report for the year ending January 31, 1909:

The total number of samples collected and examined was 21,023, as follows:

Number of samples of milk from wagons	7,312
Number of samples of milk from stores	5,925
Number of samples brought in by citizens	270
Number of samples of milk (bacteriological)	5,843
Total milk samples	<u>19,350</u>
Number of samples of vinegar	1,041
Number of samples of butter, cheese and oleomargarine	632
Total samples	<u>21,023</u>

The number of samples examined exceeded the work of any year since the establishment of the office. During 1907 a total of 18,151 examinations were made. Thus there was an increase of 2,872 examinations for 1908. As a whole, the milk from the chemical standpoint was of good quality; but owing to weather conditions there was at times a shortage of supply, and during these periods milk of inferior quality was found. The number of samples showing the addition of water was much in excess of that of any year since special examination for this adulteration has been made. One fine of \$500 was imposed upon a dealer for the sale of milk which had been mixed with water, and heavy penalties were inflicted upon other dealers for the sale of milk so adulterated. During these scarcity periods milk had to be brought here from distant points, and its quality in many respects was not of the best. Freshness and cleanliness are not the usual accompaniments of such supplies. The shortage of milk is at times a serious problem and one which is increasing in magnitude yearly, and the fact that many farmers have abandoned the production of milk is not the sole reason for this condition.

The quantity of milk used for the production of cream

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forms a factor of magnitude in this problem of procuring an adequate supply. Considering the fact that the sale of cream is constantly increasing, the obtaining of enough milk for the future requires serious consideration. The consumption of cream in Boston now averages daily about 2,110 gallons of light cream and 1,344 gallons of heavy cream. Assuming the light cream to contain about 17 per cent of fat, and the heavy cream about 40 per cent of fat, approximately the following amounts of milk would be required for its production: light cream, 10,022 gallons; heavy cream, 13,104 gallons; or a total of 92,504 quarts of milk. That this amount of milk equals 39 per cent of the quantity of milk consumed daily in this city clearly demonstrates the importance of the cream industry and its bearing upon the milk supply.

The sale of milk decreased during 1908, and some dealers report handling for the Boston trade 2 to 5 per cent less milk than in 1907. Other concerns report business conditions about the same as for 1907. Those who have noticed a decline in volume of trade attribute as a reason therefor the advance made in the price of milk in October, 1907, combined with the general business depression. This decrease in business was probably more pronounced in Boston than elsewhere, as manufacturers of food stuffs and restaurateurs decreased their orders noticeably.

NUMBER OF MILK DEALERS AND QUANTITY OF MILK HANDLED DAILY.

For several years there has been a steady decline in the number of milkmen, and last year the lowest number of wagon dealers in the history of the bureau was recorded. At that time there were 288 licenses. During the year this number was slightly increased, and there are now 294 licensed milkmen. The increase, however, was greater than that indicated by the above figures, as some of the old dealers abandoned the business and there were also some deaths. The number of shops selling milk has been slightly increased; in 1907, 3,730 such places were reported as holding permits to sell milk. There are now 3,749 of these registered establishments.

About 335,524 quarts of milk were handled daily by Boston milkmen in 1908. Of this amount approximately 303,289 quarts came here by railroad, but some of this railroad milk was used to supply other cities. Probably about 236,521 quarts of milk were consumed in this city daily. Of this quantity 204,286 quarts, or 86.37 per cent, was brought to the city

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daily by railroads; 26,955 quarts, or 11.4 per cent, was conveyed here by wagons; and 5,280 quarts, or 2.23 per cent, was produced by the 578 cows kept within the city limits. Despite the efforts to encourage the sale of milk produced near the city, the amount brought here by teams was apparently less daily than in 1907 by 4,121 quarts.

CERTIFIED AND INSPECTED MILK.

Certified milk is now being supplied to Boston from four sources, one dairy having been added during the year. The quantity of this type of milk now available daily is 955 quarts. But there is not at this time sufficient demand to require all of the supply. In fact for more than a year there has been a surplus of milk which had the seal of approval of the medical commissions, having oversight of its production. Arrangements have been perfected so that the above amount of certified milk could be readily increased by 700 quarts daily.

This milk is produced under conditions which necessitate absolute cleanliness, low temperature, healthy animals and employees, delivery while fresh, and a bacterial content of less than 10,000 bacteria per cubic cm. Considering all of these conditions, it is not a tribute to the consumers of this city that there is a surplus of this product.

What is known as inspected milk is also sold here. This variety is produced under commendable conditions, and is much cleaner than ordinary milk. The dairy regulations are not as stringent, however, as for certified milk, neither is the milk as expensive or worth as much as the certified variety. Inspected milk must not have more than 100,000 bacteria to the cubic cm. and is delivered to consumers while reasonably fresh. This inspected milk has the supervision of the medical commission of another medical society and the commission has decided to adopt caps bearing the imprint of the commission, for the bottles in which this milk is sold. These caps will serve to inform customers of the quality of the milk, and they carry the assurance that the product is better than the ordinary variety. A willingness has been noted on the part of milkmen supplying this inspected milk to coöperate in the movement in rejecting faulty dairies and installing better methods. The amount of such milk now sold here approximates 7,006 quarts daily. At this time there is an almost unlimited supply of available milk from tuberculin tested herds, which could come under the inspected classification. Desire on the part of the public to purchase this milk is the only feature lacking.

Certified and inspected milk should have hearty support from both physician and public. The former can be of great assistance in educating consumers concerning the benefits which accompany the use of clean milk. Furthermore those engaged in its production should have the backing and assurance of appreciation essential to the success of these enterprises. The generous labors of the members of these milk commissions should also be fittingly recognized by active co-operation from members of the medical profession and the public.

COW FÆCES AS A SOURCE OF TUBERCLE BACILLI IN MILK SUPPLIES.

During the year an investigation was made, which was necessarily limited by reason of lack of time, as to the presence of tubercle bacilli in the milk and fæces of tuberculous cows, and in separator slime obtained in the commercial separation of cream from milk. The condition of the cows in the latter instance was, of course, unknown.

The specimens of fæces and milk were from cows which had all reacted to the tuberculin test. Reliance for results was placed wholly upon inoculation of guinea pigs. Sixteen specimens of fæces from as many cows, and five samples of milk from five of these cows, were obtained. Subsequent to the procuring of this material these animals were all killed, and in only one instance did the post-mortem examination fail to reveal tuberculous conditions. In one cow no lesions were discovered, and the owner was indemnified for her loss. No evidence of tubercle bacilli was detected in the fæces of this animal.

Of the sixteen samples of fæces, four showed positive evidence of the presence of tubercle bacilli, and included in the number which gave negative results was the specimen from the above-mentioned cow, where upon post-mortem examination no lesions were discovered. Eliminating the specimen from this animal, and taking as a basis for calculation the fifteen samples, where tuberculin test and autopsy indicated tuberculous conditions, 26.66 per cent of the fæces contained tubercle bacilli. It must be borne in mind that only one specimen was procured from each animal. The post-mortem examinations showed generalized tuberculosis in three of the animals, and in the fourth cow disease of the mediastinal gland was indicated. None of the milk samples gave positive results for the presence of tubercle bacilli; the milks were drawn under precautions which precluded fæcal admixture,

and contamination by tubercle bacilli could have occurred only through the udder.

Nine specimens of separator slime* were subjected to examination by guinea pig inoculation, and of this number, three, or 33.33 per cent, were contaminated with tubercle bacilli. The exact manner in which the milk, from which the slimes were obtained, was infected is unknown, but the contamination was probably either through the udder, or from cow faeces containing tubercle bacilli; and the fact that a large proportion of milk contains varying quantities of this filth, demonstrates that this latter is a source of infection to be feared.

These results emphasize the importance of clean milk, and the necessity of eliminating all cows reacting to tuberculin from dairy herds. But to a city of the size of Boston, and compelled to depend upon other states for a large portion of her milk supply, the problem presented is one not readily solved. To keep milk from tuberculous animals from entering the state is possible, but it is not a feasible solution of the problem, not at least until consumers are willing to forego, for a time at least, much of the milk now required daily.

The situation affects most vitally the consumer, but considering the large percentage of tuberculous cows and the financial investment therein, the interests of the farming community cannot be eliminated from the final solution of the problem.

Meanwhile, to give immediate protection to the public from the tuberculous cow, regardless of the manner in which milk may be infected, requires the pasteurization of all milk products, excepting only the milk drawn from herds shown to be free from tuberculosis by the tuberculin test.

But such pasteurization must be properly performed, and the degree to which the milk is heated, and the duration of heating, must be sufficient for the destruction of the tubercle bacillus and other pathogenic organisms. Such treatment of milk should be by methods approved by health authorities and under their immediate control, and they should have power to destroy milk not properly pasteurized. In other words, let the pasteurization be efficient or keep the product away from the public. This milk should be sold only in bottles, and the latter should bear a label stating the date upon which the milk was heated, the degree of heat employed, and the length of time that the heating was continued. This milk should be delivered so that the bulk of it

* A chemical examination was made of two of these specimens, and the results obtained follow:

No. 1. Total solids, 27.02 per cent; fat, 2.75 per cent.

No. 2. Total solids, 33.44 per cent; fat, 2.77 per cent; ash, 4.29 per cent.

could be consumed within twenty-four to thirty-six hours of the time that it had been heated.

The heating of milk should be viewed only as a temporary makeshift, an expedient to avoid difficulties of possible serious public import, and one to be discontinued as soon as the exigencies of the situation warrant such action. Clean milk from animals, not only free from tuberculosis but from other bovine diseases, should be insisted upon, and every effort directed towards obtaining it. When this condition exists, the question of heating milk will be of secondary importance.

The procuring of the samples of fæces and milk was due to the courtesy of Dr. Austin Peters, Chief of the Cattle Bureau, Massachusetts State Board of Agriculture, and the examinations of the above material as to the presence of tubercle bacilli were made in the Bacteriological Laboratory of the Boston Board of Health, by Dr. Burdett L. Arms, the laboratory at that time being under the direction of Mr. Burt Ransom Rickards, whose co-operation made this investigation possible.

HEATED MILK.

Four contracting firms in this city are actively engaged in the sale of heated or pasteurized milk. Two of these firms sell practically all of their heated milk in bottles, while the other concerns deliver the bulk of this product in cans. One firm is equipped for heating the milk in accordance with modern methods, the temperature employed being 145 degrees Fahrenheit; the milk is then run into an automatic holding machine where it remains thirty minutes, the temperature during that time being reduced not more than five degrees. The other firms employ the continuous process, the milk being heated by one concern from 145 degrees to 150 degrees Fahrenheit; one company plans to heat the milk to 165 degrees Fahrenheit, but gives as the occasional range of temperature from 160 degrees to 167 degrees Fahrenheit. Another firm used a heat of 165 degrees Fahrenheit. Two of these latter companies are planning to immediately install holding machinery for maintaining the temperature of the milk for from twenty to thirty minutes after heating. According to the data obtainable the quantity of heated milk sold daily in this city amounts to 79,415 quarts, or 33.58 per cent of the daily supply. This quantity is considerably less than that given in a previous report.

Further details relative to heated milk appear in connection with bacteriological examination of milk from wagons and stores.

MILK CANS.

All of the milk cans now being sent into the country are returned washed, but this result has not been attained without much effort. All but one of the contractors are of the opinion that the washing of cans has brought an improvement in the supply. One firm, however, finds it difficult to enforce their rule requiring rinsing and airing of the cans before filling, some farmers contending that the cans need no further attention. The concern which alleges that no improvement has followed the washing of cans states that the responsibility is divided, and that farmers oftentimes fill cans which may not be in proper condition to receive milk. Dairymen make a serious mistake in viewing the subject in this light. The responsibility for a good milk supply rests with everyone who has to do with its production and sale. Although the cans should be sent into the country in perfect condition, it must be remembered that thousands of cans are washed here daily and in a very short space of time, and it is possible, even with the greatest care, that some may need more cleaning before being filled with milk. Such cans should receive this attention from the farmer, and no conscientious dairyman would use them for milk while they were unclean. Good milk production requires cleanliness at all times.

Cans of larger sizes continue to crowd out the old style $8\frac{1}{2}$ quart can for bringing milk from the country to this city. One firm has replaced one half of its $8\frac{1}{2}$ quart cans with cans holding 40 quarts. Another concern has added to its equipment 100 $21\frac{1}{2}$ quart cans to replace cans holding $8\frac{1}{2}$ quarts; and a third company, to provide for new business, has commenced using the $21\frac{1}{2}$ can unit, and one-third of this firm's milk is now coming here in large cans. The introduction of these cans has brought complaint from the farmer, and there is belief that the displacement has been followed by some disadvantages to the supply. Dairymen object to the size and weight of the large cans, and report that the milk does not cool as readily as in $8\frac{1}{2}$ quart cans. Furthermore, if there is a piece of a can, its disposition is difficult, as the farmer does not wish to lose the milk, and if held at the dairy and mixed with milk from the next milking, trouble may ensue. Probably this latter course is pursued in a majority of instances, regardless of consequences. Subjects like the can unit are perplexing to the dealer, who oftentimes finds it

difficult, from the standpoint of results, to decide whether or not expenditures for improvements are being made in the right direction. The experience of one concern, which has been using a large number of these 21½ quart cans, with the idea of improving the supply, illustrates this condition. This company deems the 21½ quart can desirable from the economic standpoint, and from the sanitary side as far as the tin cover is concerned, but finds a higher number of bacteria than with the old style can, by reason of the slower cooling of the large mass of milk.

One of the contracting firms is making an experiment with a cap for the 8½ quart cans, which are being used for the delivery of milk to shops. These cans have to be fitted with a special neck with a rim or lip for holding the cap, which is much heavier and thicker than the bottle cap. The idea is to obviate contamination of milk by wooden stoppers commonly used, which, although apparently clean, are oftentimes teeming with germ life. The experiment has not been continued long enough to warrant any conclusions as to its success, but the outcome will be watched with interest.

MISUSE OF MILK CONTAINERS.

Evidence is not lacking that the campaign of the last two years against the misuse of milk vessels is producing good results. But the habit of employing these utensils for promiscuous use was deep-rooted, and that it has not wholly been eradicated is not surprising. But as many shopkeepers are carefully observing the law, and refuse to fill milk bottles with other than milk products, they form an effective force in directing the attention of the purchasing public to the law and regulation upon this subject. Undoubtedly much of the wrongful use of milk vessels at the present time is at the home of the consumer, and consists of the employment of milk bottles for various household purposes. This is a form of violation which it is difficult for the authorities, unaided by milk dealers, to prevent; but the latter should be sufficiently alive to the issue to effectively check the practice. Restaurant keepers and their employees are also troublesome respecting this important matter. The 8½ quart cans, in which most of the milk is sold, form convenient cooking utensils, and years of their misuse has established a custom not quickly changed. Complaints have been lodged with the Bureau during the year relative to the misuse of milk cans in restaurants for cooking purposes. Such employment is detrimental to a good milk supply, and most cans so used are

difficult to clean; some cannot be cleaned at all. No restaurant keeper should permit the misuse of milk vessels, if for no other reason than that by so doing he is being unfair (by example and otherwise) not only to his patrons but to milk consumers in general. In investigating one of these complaints, it was found that the tops of the cans had been removed by melting the solder, and that the bottoms of these cans, technically known as "mulligans," very largely comprised the cooking outfit at this establishment, which, as it may be inferred, was not of the highest order. Such vessels, of course, are no longer milk cans, and no action could be taken under the misuse law or regulation. If milkmen are unwilling to permit their property to be so used, they must resort to other methods of procedure to secure protection.

By comparison with former years, the misuse of milk vessels at restaurants is minimized, and continued effort and time will cause further reduction in these violations. In fact, at present, some restaurants, and other shops, have provided themselves with vessels the shape of milk cans, and these are used for cooking and other purposes. Such a course does not conflict with either law or regulation as long as these cans are not employed as containers of milk.

It cannot be successfully denied that milkmen are largely responsible for the misuse of milk bottles and cans. If the dealers carefully collected all their milk containers every day, and charged their customers for bottles and cans not returned, the wrongful use of milk vessels would cease immediately. This non-return of milk vessels by shopkeepers and householders involves a large annual loss, and yet milk dealers make no effort to shake off the traditional yoke for fear of loss of trade to some competitor who would be more lenient with patrons.

This injustice forms a species of petty taxation,—not upon the milk dealer,—for in the end customers who pay their milk bills also compensate the dealer for non-returned bottles and cans. Such a course is wrong in both theory and practice, and money so spent benefits only the bottle and can manufacturers. Customers who keep milk containers belonging to milkmen should be made to pay for them, and they alone should stand the loss, then dealers could afford to apply the money now wasted upon bottles and cans to the improvement of milk supplies and methods of handling. Those consumers who now pay their milk bills, and who bear the loss for the non-return of milk containers, are entitled to such consideration from milkmen, and those who are now responsible for this unwarranted waste would also deserve like consideration

if they were compelled to bear their share of the burden, or cease their delinquencies in this direction.

During the year it was found necessary to bring several prosecutions for misuse of milk vessels, and in each instance verdicts of guilty were rendered.

In order to further restrict the misuse of milk vessels, a copy of a printed card relating to this subject was mailed to each retail liquor dealer in this city.

REGULATIONS ADOPTED DURING 1908.

During the year the Board adopted important regulations affecting the traffic in milk. One of these dealt with time-honored but reprehensible practices of milk dealers for ascertaining the flavor of milk by tasting. The methods formerly in vogue varied. With many of the dealers the custom was to remove the stopper of the can, and then the tongue of the taster was applied to the end of the stopper, which was covered with milk. The licked stopper was then returned to the can of milk, and, if the taste was satisfactory, the milk was placed upon the dealer's wagon with other cans of milk, tasted in a similar manner, and this unhygienically tasted milk was later supplied to the dealer's customers. Other dealers made use of spoons in testing their milk, and one spoon only was employed by each dealer in tasting the supply for one day, and no pretence was made of cleansing the spoon while testing the contents of the various cans. Some of the more progressive dealers sought to avoid the possibility of contamination of their supplies from the mouth of the taster by not replacing the stopper or cover of cans after they had been licked until they had been given a thorough cleansing.

After the adoption of the above-mentioned regulation, strips of cardboard about five and one-half inches long by one-half inch wide were employed by many of the dealers for conveying the milk from the can to the mouth of the taster, a new strip of cardboard being used for each can. After use the strips of cardboard are thrown away. The cardboards are inexpensive, and are supplied to milkmen by the contractors without charge. Other dealers provide themselves with a supply of tinned spoons (teaspoon size), so that they have a clean spoon for each can of milk to be tested. And with other dealers the habit of other days was so strong that court proceedings were necessary before they would abandon filthy and dangerous methods. Even after the imposition of several heavy penalties there are occasional violations of this regulation, and recently a man was found one Sunday licking

stoppers and then replacing them in milk cans. For this delinquency he was heavily fined by the judge before whom he appeared. This regulation follows:

Whereas, milk may be, and frequently is, made the carrier of typhoid fever, diphtheria, scarlet fever and other infectious and contagious diseases, and, *whereas*, the germs of said diseases may be imparted to milk by persons in the act of testing, by tasting or otherwise handling milk before delivery to consumers;

It is therefore ordered, Whoever tests milk or cream which is to be offered for sale in any form by tasting shall do so by means of a spoon or piece of wood, paper, cardboard or other article, and such spoon, piece of wood, paper, cardboard or other article shall not again be brought in contact with milk intended for sale, or be used for testing milk, until after being thoroughly washed and sterilized; no person shall permit his hands, fingers, lips or tongue to come in contact with milk intended for sale in any form. All persons engaged in the tasting, mixing or handling of milk for sale in any form shall, before engaging in such tasting, mixing or handling, thoroughly clean his hands and finger nails and keep them clean and dry during such tasting, mixing or handling. No person shall permit his hands while wet to remain or pass over any open vessel containing milk intended for sale in any form. No person shall fill a jar, can or other receptacle with milk while the aforesaid jar, can or other receptacle is held over an open vessel containing milk intended for sale in any form. No person who has sore throat, diarrhoea, or is suffering from any other disturbance of the bowels, or has symptoms of infectious or contagious disease, shall engage in the handling of milk which is to be offered for sale, or which is for sale.

Another and important regulation was also adopted by the Board. This dealt with the subject of cleaning vessels used in the transportation, sale and delivery of milk; and also restricted spitting during the sale, storage, handling and transportation of milk.

This regulation met with much commendation by both citizens and dealers. Many of the latter, realizing the filthy condition in which many milk vessels are returned (and more especially during the summer months), have aided the Bureau in acquainting their customers with the Board's action. One dealer had the regulation reprinted, and gave a copy to each of his customers, and many others applied for and received printed copies of the regulations at this office, for distribution to patrons.

Decency and safeguarding of the public health requires that strict attention should be given to the cleaning of all containers used in the sale of milk. Not infrequently cans

and bottles are returned to milkmen in such a condition that they have to be thrown away. Milk vessels should be thoroughly cleaned by consumers as well as by milkmen. After washing, milk vessels should be thoroughly scalded with boiling water, and then allowed to drain; they should never be wiped with dish cloths.

Since the adoption of this regulation several shopkeepers were found who had failed to comply with its requirements. These were haled to court, and in each case a verdict of guilty was rendered, and fines of from five to ten dollars have been imposed.

A copy of the regulation follows:

All persons having the possession or custody of bottles, cans or other receptacles used in the sale, delivery and transportation of milk, cream, skimmed milk or buttermilk, shall cause any such bottle, can or receptacle to be cleaned immediately upon emptying the same; and no person shall deliver, receive or have in his possession or custody any such bottle, can, or receptacle so used which has not been cleansed as aforesaid.

No person shall expectorate or spit, except in receptacles provided for the purpose, in or upon any part of any room, vehicle, railroad car, railroad platform, or other place used for the sale, storage, handling or transportation of milk.

Printed copies of each of these regulations were mailed to each dealer who holds a permit from this office to sell milk, and in addition to those sent from this office many copies of the latter regulation were distributed by milkmen. Each shopkeeper also received by mail a copy of a "spitting prohibited" card based upon the latter regulation. These cards were intended to be posted in each store; they are also prominently displayed at the places of business of each contractor, and one of the large firms has had them posted at each of its receiving stations in the country.

To further emphasize the regulation concerning the handling of milk during outbreaks of contagious diseases, the following notice calling attention to the danger from milk-borne epidemics was adopted by the Board, and over 4,000 printed copies were mailed to milk sellers.

If typhoid fever, scarlet fever, diphtheria, tuberculosis, or any other disease occurs either in yourself, or in your families or help, the germs may find their way into the milk which you are selling and cause much sickness. The sale of such milk may also ruin your business. Milk contaminated with these germs should never be used; it should be destroyed.

When typhoid fever, scarlet fever, diphtheria or tuberculosis

exists, or the presence of any disease is suspected at the dairy or place where milk is handled or sold, immediately notify the Board of Health. The Board of Health will co-operate with you in safeguarding the public, and at the same time not interfere with your business to any greater extent than is necessary to prevent sickness.

This subject is of much importance to milk users as well as to milk producers and dealers, and the object to be attained necessitates the hearty support of all concerned.

INVESTIGATION OF COMPLAINTS.

Each year brings with it necessity for a greater amount of work relative to the handling of milk in a sanitary manner. This is an evidence of increased interest in the public mind concerning clean milk, as no insignificant portion of this labor is based upon complaints received from consumers. The Bureau desires information of this nature, and wishes to correct conditions whenever it is possible to do so. Public concern and aid is an important factor in the contest being waged for better milk supplies.

The complaints brought to the attention of the Bureau during the year cover a wide range, and specifically (although not all enumerated) they are not lacking in interest, as evidenced by those noted. These involved the misuse of milk vessels; the cooking of milk in cans; improperly testing milk by tasting by means of a stopper and then returning the latter to the can. In this latter instance the complainant was unwilling to state the facts in court, and so no action could be taken other than to warn the dealer. Information was received concerning a dirty dairy in another state, the milk from which was coming to Boston. The attention of the firm purchasing the milk was called to the facts and the concern immediately stopped buying the milk. There were also complaints concerning the sale of "stale" milk in a shop; as to uncleanness of an out-of-town creamery and alleged methods of testing the milk by tasting, employed there; at another creamery, located outside this city, it was alleged that unwashed cans were being returned to farmers; the condition of garments and gloves worn by employees while engaged in the bottling of cream and handling of milk was also criticised, as was the use of dirty ice, objectionable methods of cooling skimmed milk, and the brief time devoted to the steaming of bottles and cans for sterilizing purposes. The odor from a cheese plant, located at a creamery where milk and cream were handled, was deemed objectionable, as was the foul condition of returned cans, and promiscuous spitting

upon the floor of a creamery. The transportation of milk in the country in uncovered wagons also received attention, as did an unclean basement of a creamery; the condition of milk cans and dirty cars; the pouring of milk from cans in dirty cars into piped tanks, from which it was conveyed into the bottling department; uncovered milk tanks; lack of protection for caps used in bottling milk; insufficient clean-outs for pipes used for distributing milk at a creamery; dirty condition of a creamery; dirty broken-down ice chests; failure to wash all cans and a foul-smelling sink in a room used for mixing and bottling milk are some of the other subjects which came under the observation of the Bureau.

These complaints have all received attention, and in the majority of instances a prompt compliance with suggestions was noted. Criticisms from consumers produce an alertness in dealers which bespeaks increased interest concerning the responsibilities devolving upon those engaged in the milk traffic.

DAIRY INSPECTION.

Although not as many dairies were reported for insanitary conditions as during 1907, yet more time was required for the investigation of these places this year than was devoted to the work during the preceding year. This involved much correspondence and time, and there have also been repeated visits to dairies near Boston where undesirable conditions existed.

These dairies have received attention as a result of reports submitted to your Board by the State Board of Health, which reports were subsequently forwarded to this Bureau.

Many of the places investigated last year were farms where pigs were also raised, the principal food of the latter being swill, and in a majority of instances its use was attended with many objectionable features, from the standpoint of good milk production. The piggeries and swill were usually in close proximity to the cow barns. This year, however, only one place where the conditions were approximately as stated above came under the observation of the Bureau. At this farm the "pigs and swill were kept in the barn cellar." The complaints concerning the other places varied, and a partial list includes cows in a filthy condition; accumulated manure in cow tie-ups; straining milk in tie-ups; storing milk back of cows or horses; bedding cows with horse manure; sour brewery grains; insufficient window space.

In dealing with these conditions, the policy adopted in

previous years was continued, namely, that of holding dealers responsible for dairy conditions. Circumstances made this method necessary, and regardless of the procedure pursued the oversight should always be placed with those engaged in supplying the public with this commodity. No one is obliged to deal in milk, but those who elect to do so must assume the attendant risks and obligations. The dealer who is unwilling to do this should be deprived of his right to cater to the public.

Most milkmen engaged in the business in this city are willing to co-operate with the authorities in stamping out existing evils, but a few look upon the correction of insanitary conditions as an interference with their business. Regardless of the attitude of milkmen, there has been an insistence that the product of offending dairies be kept from this city until changes were made in conditions surrounding the production of milk. From a majority of these dairies reports were finally received that the desired changes had been made, but in a few instances dairymen made no improvements, and so the milkmen who had been purchasing their milk were notified to procure their supplies elsewhere. A number of the adverse reports made this year were of farms where, upon second inspection, the changes suggested at a prior inspection had not been put in force. The product from all of these farms was immediately prohibited from coming to this city, a procedure which in most instances brought the desired changes; at a few dairies the improvements went beyond those proposed by the authorities. One beneficial result of the work this year was that one of the small contractors, who was much discouraged because several of his dairies were excluded from this market, finally adopted heroic measures, and employed an agent to visit all of his dairies, and with such good success that many of the farms (which had not been seen by the authorities) were found to be, when inspected, in a passable condition.

A summary follows:

Number of insanitary dairies	66
Number of dairies found on second inspection not to have made the charges suggested on first inspection, and from which the milk was ordered excluded from this market. (This prohibition was later removed from most of these dairies.)	54
Number of dairies found not to be selling milk in Boston	22
Number of dairies found to be selling to other dealers than those alleged	7
Number of dairies where no improvements were made, and where milkmen stopped purchasing the milk	3

Number of dairies reported as complying with conditions
 (this includes some of the farms not sending milk to
 Boston) 47

In addition to the above, action was taken concerning the withholding of the licenses of milkmen for refusing to comply with the requirements of the Board. Subsequently improvements in the plants of these dealers were made, and the permits were granted.

UNDESIRABLE DAIRIES.

Good dairy conditions are of vital importance to milk production, for milk spoiled at the farm is beyond recall, consequently the necessity for cleanliness and care is apparent. But where dirty methods prevail, the mere statement of the above fact fails to bring the desired improvement. Energy and effort are required for the displacement of neglect and slovenly habits by care and cleanliness. The educational feature must also be considered, for many farmers see no reason why the old customs are not the proper ones for good milk production. Consequently the battle against dirt and neglect is not to be won without effort.

Leased farms are apparently not places where the production of high grade milk may be expected, and the work of last year furnishes additional testimony in support of this statement. The prime reason for this condition is the fact that lessees do not care to spend money to improve property belonging to others. Within the year a licensed dealer erected a milk room several miles from the leased farm where his milk was produced. This milk room was of the modern type, and the dealer had just reason to be pleased with it, and to solicit inspection. But this did not extend to the leased farm, where the milk was produced, and a visit to the place explained the reason, as there was ample evidence of neglect. Unclean tie-ups, cobwebs, unclean areaway between tie-ups, sour brewery grains, barn yard muddy and filthy, barn cellar full of semi-liquid *excreta*, dirty milk cans (one containing hay and another sour milk), an ill-smelling battered cooler, in the dents of which there were sour, moldy milk smears, and no ice supply, were some of the features which rendered good milk production impossible. Yet this supply was transported to and bottled in the above especially constructed milk room.

At another dairy, which was not a leased farm, the product of a portion of the herd was being used for baby milk. These animals were quartered in the oldest barn on the place; they were not clean and were found standing in manure, and the

abundance of cobwebs and dirt overhead testified to lack of care. The owner farmed for pleasure, and took pride in his dairy, but the oversight was intrusted to others.

Perhaps the worst place visited was a small dairy, where it was discovered that a little milk was being sold without a permit. The barn was filthy, the ventilation poor, there was no drain in the tie-up and the liquid *excreta* ran underneath the floor and formed a slimy pool; calves, horses, and a sow with a litter of pigs were also kept in the barn. It is not surprising that a bad odor pervaded the place.

The dairies cited above are only types; invariably visits to farms have been followed by improvement; but dair inspection at the present time, from the standpoint of accomplishing all that is desired, may be classified as a never-ending work.

BACTERIOLOGIC EXAMINATION OF MILK.

The standard for bacteria in milk of 500,000 per cubic cm. established by the Board has been of material value in bettering the milk supply of this city. This standard has been employed on an educational basis with good results. It has produced an awakening for improved conditions which has not been confined to the limits of the city. The influence of this regulation has probably been felt in varying form and degree at every farm from which milk comes to Boston. That better results have not been obtained does not bring the method which has been pursued into question, nor indicate any reason for discouragement. It emphasizes rather the magnitude of the adverse conditions surrounding the production of milk, and the necessity for constant effort to secure cleaner milk. While conditions are constantly improving, it is essential that greater discrimination be exercised by contractors, and that all undesirable dairies be excluded from this market. Until this is done there can be no lasting improvement in the supply.

In all, 5,843 samples were subjected to bacteriological examination; this is the largest number tested in any year since the commencement of the work. Most of these specimens were taken from contractors, as the trains arrive from the country laden with milk. A total of 4,204 were procured in this manner, and this is 1,428 more samples than were obtained from contractors in 1907. During 1908, warnings to the number of 573 were sent to dealers (milkmen and shopkeepers) for milk containing excessive amounts of bacteria; of this number 273 were sent to contractors, and by the latter subsequently mailed to farmers in the country.

The character of the milk obtained from contractors is indicated in Table 1.

Table I.—Bacteriologic Examination of Milk Samples from Contractors. Taken from Cars on Arrival.

BACTERIA PER CUBIC CENTIMETER.	Number.	Per Cent.
Under 50,000.....	2,144	50.99
50,000 to 100,000.....	475	11.29
100,000 to 200,000.....	633	15.06
200,000 to 300,000.....	197	4.68
300,000 to 400,000.....	103	2.45
400,000 to 500,000.....	82	1.95
Total under 500,000.....	3,634	86.42
500,000 to 600,000.....	107	2.55
600,000 to 1,000,000.....	165	3.93
1,000,000 to 3,000,000.....	167	3.97
3,000,000 to 5,000,000.....	62	1.49
5,000,000 to 10,000,000.....	30	.71
Above 10,000,000.....	39	.93
Total above 500,000.....	570	13.58
Total.....	4,204	100.00

The improvement is seen in the percentage of samples with less than 50,000 bacteria to the cubic cm., and this is further illustrated in the percentage of specimens under 200,000 bacteria. In fact, 77.34 per cent of the samples taken in the above manner had a bacterial content of under 200,000 per cubic cm., indicating that with a system of quick delivery it would be possible to supply milk with comparatively few bacteria to consumers. Table I. shows that 86.42 per cent of this milk complied with the regulation, while 13.58 per cent contained a larger number of bacteria.

There were too many samples with bacteria running into the millions, and the number of these samples, heavily laden with germs, must be reduced. Many of the specimens of this latter type owe their large germ content to conditions which might be readily obviated by means of ordinary care and intelligence. Undoubtedly some of them are from farms where dirty conditions and filthy methods prevail. Milkmen purchasing directly from farmers should become cognizant of all such dairies, whether within or without the state, and should refuse to purchase milk so produced. Milkmen should take pride in the quality of their product, and there should be

Table II.—Bacteriologic Examination of Milk Samples from Individual Contractors. These Specimens are Considered Collectively in the Preceding Table.

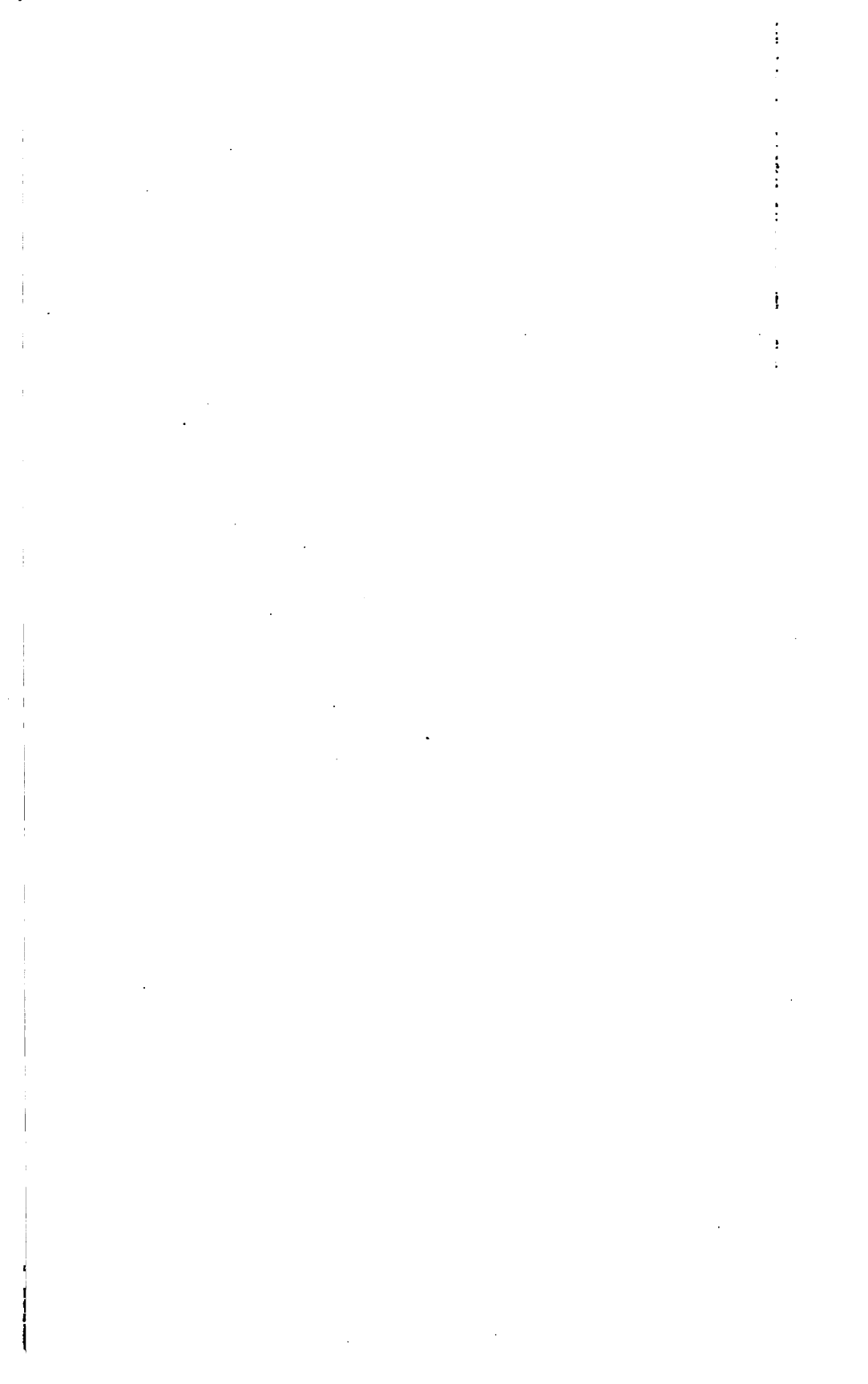
	A		B		C		D		E		F		G	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
BACTERIA PER CUBIC CENTIMETER.														
Under 50,000	125	64.43	330	52.05	424	56.68	222	49.00	423	53.14	257	42.90	363	46.54
50,000 to 100,000.....	23	11.85	78	12.30	85	11.36	51	11.26	99	12.44	61	10.19	78	10.00
100,000 to 200,000.....	30	15.46	101	15.95	116	15.51	64	14.12	127	15.95	91	15.19	104	13.33
200,000 to 300,000.....	5	2.58	30	4.73	26	3.48	20	4.41	38	4.77	35	5.84	43	5.51
300,000 to 400,000.....	2	1.03	10	1.57	16	2.14	5	1.10	27	3.39	21	3.51	22	2.82
400,000 to 500,000.....	.....	.....	9	1.42	15	2.01	8	1.77	11	1.38	15	2.50	24	3.08
500,000 to 600,000.....	.....	.....	14	2.21	12	1.60	9	1.99	19	2.39	25	4.17	28	3.59
600,000 to 1,000,000.....	2	1.03	25	3.94	15	2.01	26	5.74	25	3.14	30	5.01	42	5.39
1,000,000 to 3,000,000.....	5	2.58	25	3.94	21	2.81	25	5.52	10	1.26	39	6.51	42	5.39
3,000,000 to 5,000,000.....	1	.52	4	.63	11	1.47	8	1.77	7	.88	10	1.67	21	2.69
5,000,000 to 10,000,000.....	1	.52	4	.63	1	.13	7	1.55	2	.25	8	1.34	7	.89
Above 10,000,000.....	.....	.....	4	.63	6	.80	8	1.77	8	1.01	7	1.17	6	.77
Total under 500,000	185	95.35	558	88.02	682	91.18	370	81.66	725	91.07	480	80.13	634	81.28
Total above 500,000	9	4.65	76	11.98	66	8.82	83	18.34	71	8.93	119	19.87	146	18.72
Total.....	194	100	634	100	748	100	453	100	796	100	599	100	780	100

keen rivalry to supply trade with clean, fresh milk. Dealers who are unwilling to conduct their business with this idea for their main object are unfitted to deal in this commodity.

Table II. denotes the character of the milk from the individual contractors, and the results are much better than those for 1907. All of the concerns but "A" and "D" have improved their standing. In the case of "A," the falling off is not marked, being only 0.55 per cent; with "D" the loss is more pronounced, namely, 6.29 per cent. With the percentage of samples containing less than 50,000 bacteria to the cubic cm., there was also a gratifying gain, only "A" and "D" failing to show improvement. The percentage of samples with more than the legal number of bacteria is not without interest. Of the individual firms, 4.65 to 19.87 per cent of samples in excess of the standard is indicated. It is significant that the firms with the two highest percentages in excess of the standard are concerns engaged in pasteurizing milk, and a third contractor, who also pasteurizes milk, has a large percentage of samples exceeding 500,000 bacteria per cubic cm. Two of these firms are making efforts to improve farm conditions, and have inspectors visiting and advising dairymen. One of these concerns has a bacteriological laboratory, and another has recently commenced active bacteriologic work. The third concern which pasteurizes its milk has done no farm inspection worth recording, and although the firm had a bacteriological laboratory before the advent of pasteurizing machinery, after that period the laboratory was closed. These facts are noteworthy. Another concern, with a large percentage of samples in excess of the regulation, has not carried on active dairy inspection or bacteriologic examination of milk. Recently, however, and at the instance of this Bureau, bacteriologic work was commenced and is to be continued.

Chart I. shows the comparative bacteriologic standing of the contracting firms for 1905, 1906, 1907 and 1908; also the percentage of infected milk from these concerns for the same years. As previously noted, improvement in the standing of most of the concerns is observable. Concerning infected milk, a larger percentage is indicated than for 1907, but by comparison with 1905 and 1906 the improvement is pronounced.

The gain in the percentage of samples which complied with the standard of the Board was not confined to milk taken from contractors; the specimens from wagons and stores also conformed to the regulation to an increased extent. This improvement in samples from all sources is remarkable, in view of the drought and prolonged high temperature of



last year. It is to be hoped that the gain in samples complying with regulation is in a measure due to the efforts which have been put forth to obtain better milk. Mention of the fact has been made previously that much of the increase of bacteria in milk, after it reaches this city, is due to its being retained by milkmen prior to delivery to consumers. Consumers and custom are responsible for this condition, but it is questionable if delivery of milk to consumers on the day of arrival would be of greater benefit to the public than now results under present methods. It is true that with a system of delivery on the day of arrival it would be necessary for consumers to keep some of the milk for use on the morning of the following day, and probably with most householders the conditions as to temperature and surroundings would not be as favorable to the milk as though it was retained by milkmen, as is now being done. There would be this advantage, however, that a large proportion of the milk would be consumed on the day of delivery.

Table III.—Bacteriologic Examination of Milk Samples from Wagons.

BACTERIA PER CUBIC CENTIMETER.	Number.	Per Cent.
Under 50,000.....	523	41.02
50,000 to 100,000.....	100	7.84
100,000 to 200,000.....	155	12.15
200,000 to 300,000.....	52	4.08
300,000 to 400,000.....	41	3.22
400,000 to 500,000.....	49	3.84
Total wagon samples under 500,000.....	920	72.15
500,000 to 600,000.....	57	4.47
600,000 to 1,000,000.....	109	8.55
1,000,000 to 3,000,000.....	151	11.84
3,000,000 to 5,000,000.....	26	2.04
5,000,000 to 10,000,000.....	9	.71
Above 10,000,000.....	3	.24
Total wagon samples above 500,000.....	355	27.85
Total.....	1,275	100.00

Table III. indicates the results obtained from the examination of wagon samples. Of these 72.15 per cent were

found to have less than 500,000 bacteria per cubic cm., and 27.85 per cent were in excess of the limit. A marked comparative gain over 1907 is noted in the percentage of specimens under 50,000 bacteria to the cubic cm. In 1907 the percentage of these samples was only 22.44, but last year this was increased to 41.02. In 1908, 61.01 per cent of the milk from wagons had less than 200,000 bacteria to the cubic cm.

In connection with the wagon milk the question of containers is of importance. Of the milk taken from bottles in 1908, 75.27 per cent contained less than 500,000 bacteria per cubic cm., while can samples complied with the standard to the extent of only 67.91 per cent. The comparative difference, while not large, is favorable to the bottled milk; similar results have been found from the work of other years. The difference in favor of bottled milk is probably due to the influence of unsterilized wooden stoppers, and possibly also to the selection of a better class of dairies for bottling purposes. This difference in favor of bottled milk is even more pronounced with the heated, or "commercially pasteurized," milk, as denoted in Table IV., which follows:

Table IV.—Bacteriologic Examination of Pasteurized Milk from Wagons.

BACTERIA PER CUBIC CENTIMETER.	CANS.		BOTTLES.	
	Number.	Per Cent.	Number.	Per Cent.
Under 50,000.....	23	16.31	22	46.81
50,000 to 100,000.....	7	4.96	8	17.02
100,000 to 200,000.....	13	9.22	9	19.15
200,000 to 300,000.....	19	13.47	1	2.13
300,000 to 400,000.....	16	11.35	3	6.38
400,000 to 500,000.....	7	4.96		
Total samples under 500,000.....	85	60.27	43	91.49
500,000 to 600,000.....	13	9.22	1	2.13
600,000 to 1,000,000.....	20	14.19		
1,000,000 to 3,000,000.....	16	11.35	2	4.25
3,000,000 to 5,000,000.....	4	2.84	1	2.13
5,000,000 to 10,000,000.....	1	.71		
Above 10,000,000.....	2	1.42		
Total samples above 500,000.....	56	39.73	4	8.51
Total.....	141	100.00	47	100.00

As will be seen from these figures, 91.49 per cent of the bottled milk had less than 500,000 bacteria per cubic cm., as against 60.27 per cent of the samples taken from cans. Of this bottled milk, which complied with the regulation, 82.98 per cent of the specimens contained under 200,000 bacteria to the cubic cm., while 25.54 per cent of the milk from cans contained from 600,000 to 3,000,000 bacteria per cubic cm. These results point to the necessity of employing bottles exclusively as containers of heated milk.

Table V. indicates the character of the milk collected at stores during 1908, and although it denotes a great improvement over the store samples of last year, it also proves conclusively that this milk is of the worst type obtainable. Even the best of it is, probably by reason of age, unsuited for infant feeding; in fact, store milk should never be used as food for the young. This point should be emphasized by all those interested in good milk supplies, and every effort should be made to discourage the sale of shop milk until such time as its quality improves materially, if such a condition is possible.

Table V.—Bacteriologic Examination of Milk Samples from Stores.

BACTERIA PER CUBIC CENTIMETER.	Number.	Per Cent.
Under 50,000.....	52	18.50
50,000 to 100,000.....	12	4.27
100,000 to 200,000.....	23	8.19
200,000 to 300,000.....	14	4.98
300,000 to 400,000.....	12	4.27
400,000 to 500,000.....	9	3.20
Total store samples under 500,000.....	122	43.41
500,000 to 600,000.....	23	8.19
600,000 to 1,000,000.....	51	18.15
1,000,000 to 3,000,000.....	54	19.22
3,000,000 to 5,000,000.....	17	6.05
5,000,000 to 10,000,000.....	7	2.49
Above 10,000,000.....	7	2.49
Total store samples above 500,000.....	159	56.59
Total.....	281	100.00

Purchasers should accustom themselves to obtain their milk from other sources. Dependence upon shop milk can be

viewed only as a dangerous convenience. No doubt the use of shop milk has not been without disastrous results to humanity. Physicians should not countenance its employment as food for either the young or invalids. In fact it has been said of this type of milk that it is unfit for any purpose.

Of the milk from shops, 43.41 per cent complied with the standard of the Board, and 56.59 per cent had bacteria in excess of the limit. In 1907 only 36 per cent of the store milk had bacteria of less than 500,000 per cubic cm., and in the same year only 10.86 per cent of the samples had less than 100,000 bacteria to the cubic cm., while the comparative figure for 1908 is 22.77 per cent.

A better condition is also indicated in the samples of heated milk from shops. In 1907 only 34.25 per cent of this heated shop milk had less than 500,000 bacteria to the cubic cm., while in 1908, 51.77 per cent complied with the regulation. The percentage of heated shop milk conforming to the standard is greater than that of the total store milk. The opposite condition was found to exist in 1907. The handling of heated milk in shops, however, is not attended with good results.

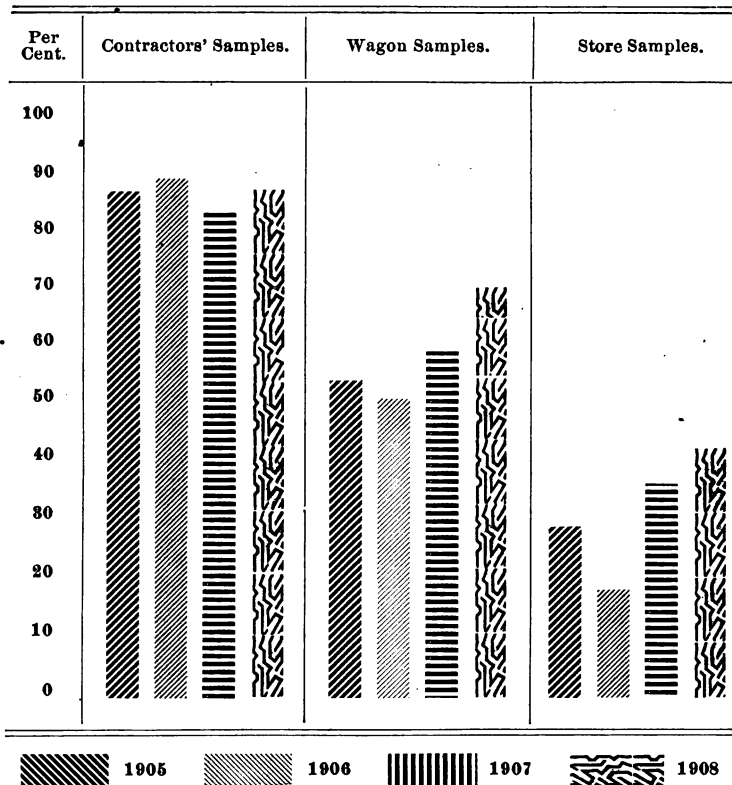
Although the figures point to an improvement in the condition of shop milk, there can be no lasting change for the better until fewer shops are allowed to deal in this commodity. Greater scrutiny of both individuals and establishments will be necessary before a permanent gain can be made. In consequence of this belief, the recommendation is made that more discrimination be exercised in granting permits to shops to sell milk, and that the registration of shopkeepers found to be handling milk in violation of the regulations be revoked.

Bacteriologic examinations were also made upon 83 unclassified samples of milk, and 92.76 per cent of these complied with the regulation. Many of these specimens were brought to the office by reason of complaints as to quality, and some had been kept under conditions not conducive to retarding the growth of bacteria. In spite of these adverse surroundings, most of the samples were of low bacterial content.

The diagram which follows shows the comparative percentage of specimens from contractors, wagons and shops for 1905, 1906, 1907 and 1908, which complied with the regulation of the Board of Health.

The contractors' column indicates the condition of the milk as it arrives from the country; the wagon and store samples were obtained as the milk was being sold or delivered to consumers upon the day following its receipt in this city. An improvement is indicated in the milk from all sources, but the contractors' milk does not equal the percentage for 1906.

The examinations of milk samples for bacterial content and for pus organisms were made in the bacteriological laboratory, which during the year has been under the charge of, first, Mr. Burt Ransom Rickards and later of Dr. Francis H. Slack.



MILK CONTAMINATED WITH PUS AND STREPTOCOCCI.

That much progress has been made since 1905 in the suppression of infected milk is apparent from the percentage of these abnormal samples obtained during 1908. It is true that the percentage is not as low as during 1907, but this result was not unexpected, as in the report made last year it was predicted that the amount of infected milk was probably below that of the average year. The point to be borne in mind is the large decrease in the number of these abnormal milk specimens since 1905, when the policy of exclusion of milk reported as contaminated with pus and streptococci was inaugurated. During 1908, 5,843 samples were examined

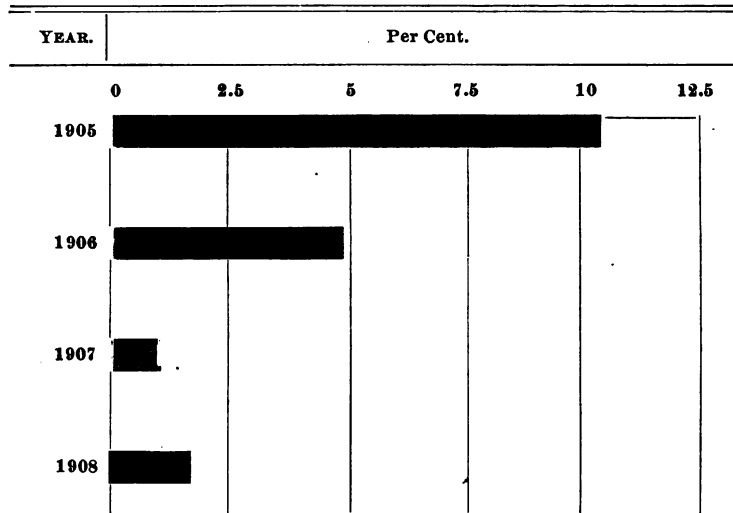
for these organisms, and 107, or 1.83 per cent, were reported as infected. The results by months are shown in Table VI.

* Table VI.

MONTH.	Total Samples Examined.	Number Con- taining Pus.	Number Con- taining Pus and Strep- tococci.	Number Containing Streptococci.	Per Cent of Infected Samples.
February, 1908.....	555	25	3	.....	5.04
March.....	558	17	.....	.....	3.05
April.....	471	16	.....	.....	3.40
May.....	208	6	.....	.....	2.88
June.....	571	4	1	1	1.05
July.....	264	.....	.....	.....	.....
August.....	325	3	.....	2	1.54
September.....	555	1	.....	.....	.18
October.....	593	8	.....	1	1.52
November.....	495	7	.....	1	1.61
December.....	667	6	.....	.....	.90
January, 1909.....	581	4	1	.....	.86
Total.....	5,843	97	5	5	.....

* In addition to the number of infected samples given in the above table, the following infected samples were obtained: February, 1; March, 23; and April, 4. These specimens were either brought to the office or taken at dairies, and were procured in the investigation of infected milk collected in the ordinary manner.

The comparative percentage of milk so infected for the years 1905, 1906, 1907 and 1908 is shown in the following diagram. During 1905, 5,559 samples were examined, and



583, or 10.48 per cent, were reported for their pus, pus and streptococci, or streptococci content. In 1906, of 5,007

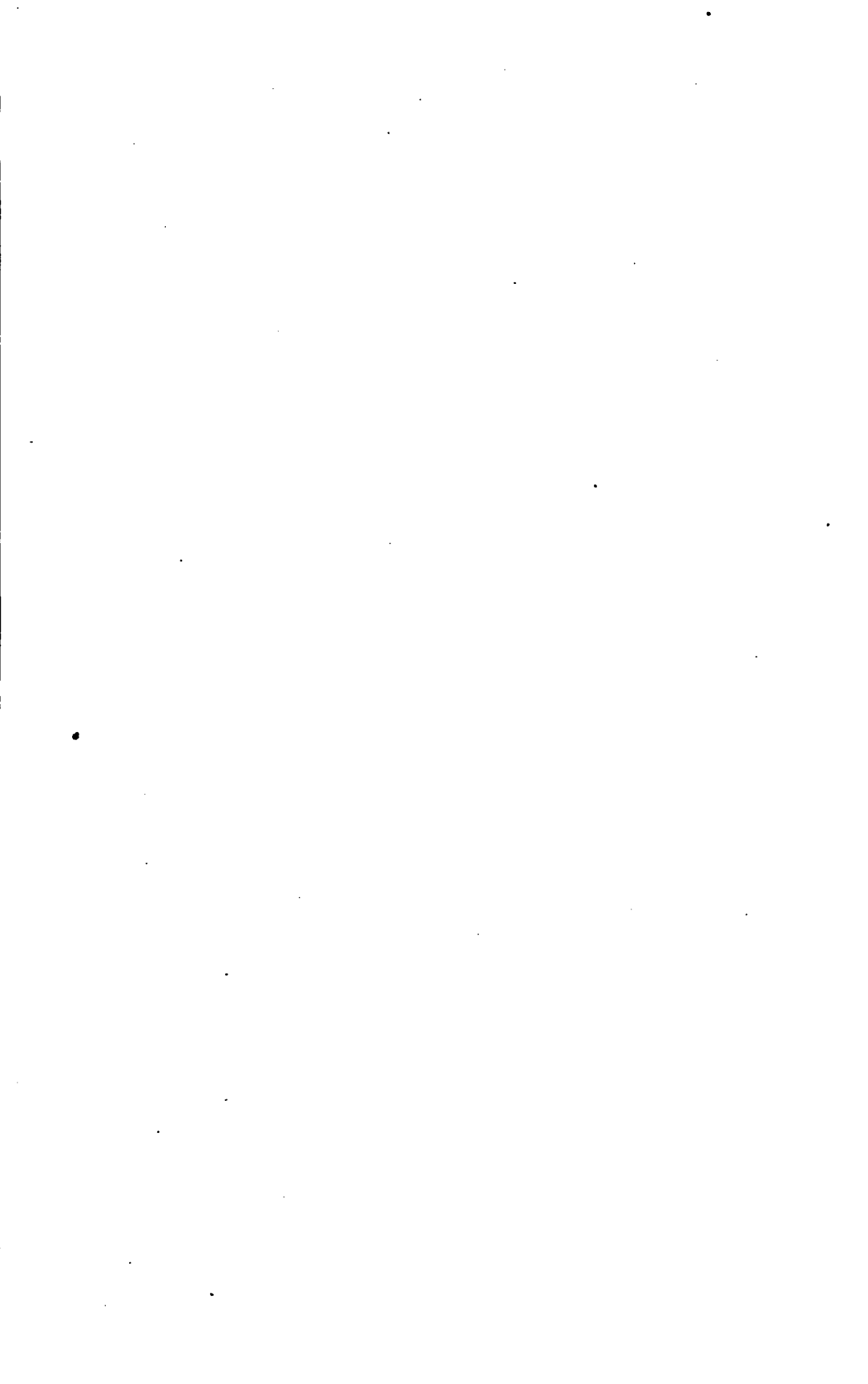
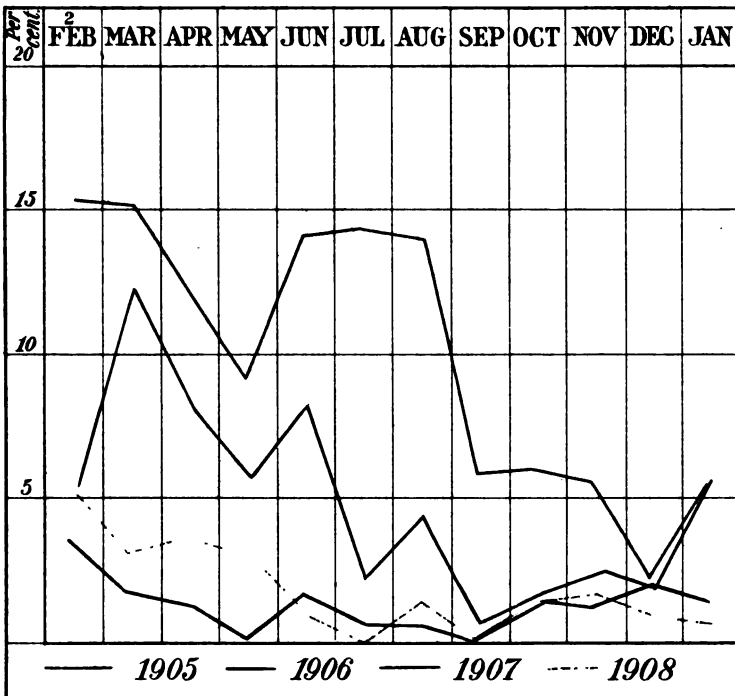


CHART NO. 2



1. See Chart No. 1 for percentage of infected milk for 1905, 1906, 1907 and 1908 from Contractors only.
2. The official year begins February 1.

samples, 246, or 4.9 per cent, were thus contaminated; and in 1907, when 4,609 milk samples were tested, only 52, or 1.1 per cent, showed infection. The figures for 1908 have been given above.

The percentage of infected milk for 1905, 1906, 1907 and 1908 is shown comparatively by months in Chart II.

In July none of these abnormal samples were found; the other months in which improvement was shown over the results for 1907 were June, December, 1908, and January, 1909.

These results denote the pronounced betterment which followed the beginning of this work in 1905; and while the determined policy of exclusion which has been pursued is responsible for the marked gain, the assistance which the contractors have given the Bureau is worthy of note, and should be placed to their credit. At this writing all of the contractors but one are either maintaining and operating bacteriological laboratories, or are having such work performed for them at independent laboratories. These laboratories and examinations are carried on at the expense of these firms, and have greatly aided in lessening the amount of their undesirable milk.

No doubt also their endeavors have been of assistance in directing the attention of producers to the undesirability of sending milk from diseased animals to this market. Unfortunately, either from ignorance or intent, this idea has not impressed itself upon the majority of dairymen; compulsory measures have had to be employed in most instances to secure the results desired. This state of affairs is significant, and demonstrates the protection which consumers receive when the question of products from unhealthy animals is intrusted to farmers who are the owners of the stock. Apparently, if any consideration is given the subject, it is from the narrow and selfish standpoint of self-interest, which takes the form of an unwillingness to lose a few cents' worth of milk, even though the health of human beings may be endangered by its subsequent use. It is difficult to draw any other conclusion than the above from the continued finding of these contaminated specimens, many of which are from animals where cursory examination shows their unfitness for milk production.

That consumers are not given the protection which they may rightfully expect has been demonstrated many times by the examinations which followed the finding of abnormal specimens. It is time that this condition was corrected, and although much has been accomplished in this respect by

local dealers, greater efforts should be put forth to compel dairymen to keep from their milk supply the product of all animals not free from suspicion.

That such a course has been made necessary is not a condition tending towards increasing the consumption of milk; it is a state of affairs discreditable to producers. Consumers have a right to expect alertness from farmers in guarding their health at all times, and in what more practical manner can this protection be shown than by not sending to market milk from diseased cows?

This is not done, however, in all instances, and a recent case of neglect undoubtedly produced illness in two children whose diet was principally milk. Investigation showed that the milk was from a cow which had injure done teat, and the milk from the other three quarters, which was being used, contained much pus. To make the condition still worse, the morning of the day that the Bureau investigated the matter a new man in charge of the milking had put the milk from all four teats into the supply. None of the milk should have been employed for food at any time after the cow injured herself. That this was a repetition of what had occurred many times in 1905, 1906 and 1907 is amply demonstrated by a perusal of the reports for those years. Well may consumers lose faith in those producing milk, when such conditions are constantly arising. Furthermore, the cases cited in the above reports and those which follow are only those where information could be obtained relative to the finding of abnormal milk. There were many instances each year where no statement of facts concerning the condition of herds could be secured. Much of this data has been obtained from contracting firms, and the most of these concerns have rendered commendable aid in the investigations. In a few instances lack of interest has been noted. The list which follows demonstrates, as has been the case in other years, that dairymen have it in their power to materially reduce the amount of infected milk. That it is not done illustrates their disregard for the consumer's interest, and the necessity for greater discrimination on the part of purchasers in the choice of those who supply them with milk. This information was obtained as the result of investigating milk specimens found to be abnormal; with other infected milk no data was procurable.

The results follow:

1. Farmer reports one cow as having injured her udder by a fall and attributes the trouble to this cause.
2. One cow just drying up.

3. Nine cows of a herd of forty were found to have mammitis.

4. Seven cows of a large herd had minor troubles with either their teats or udders, and two of the animals had fistulas entering into the milk ducts. The animals comprising this herd had been troubled with cowpox.

5. Gargety cow.

6. One cow found to have mammitis.

7. One cow found to be tuberculous. This animal was later condemned by the Cattle Bureau of this state and killed by order of that Bureau.

8. One cow with abscess on udder.

9. Cow suffering with mammitis.

10. New milch cow, gargety.

11. Cow with garget in one quarter of her udder.

12. Cow with enlargement of one quarter of her udder.

13. Two cows with infected quarters.

14. One cow with a broken down quarter.

15. One cow with garget; the owner reports that this cow had suffered from this trouble on a prior occasion.

16. A mixed milk was contaminated with pus. Investigation showed that several farmers supplying this milk were milking strippers, and that as soon as the product from these animals was kept out of the supply the trouble ceased.

17. One cow with garget in a herd of ten.

18. Gargety cow being dried off.

19. Gargety cow. The owner discontinued using the milk for a time, but evidently did not wait until the animal had fully recovered.

20. Cow with inflamed bag. Owner states that as soon as he discovered the trouble he stopped sending her milk to this city.

21. Cow with a purulent and offensive discharge from one teat. This fact was known at the dairy, but the milk from the other three quarters was being used; the trouble with the cow was not localized and the mixed milk contained much pus. None of the milk should have been used, and the cow should have been removed from the herd, if for no other reason than that of danger of infecting the other animals. As soon as the conditions at this dairy became known, this step was immediately taken upon recommendation of the authorities. Guinea pigs were inoculated with some of the material from this cow's udder, and the results proved conclusively that the animal was tuberculous.

At this farm it was also found that seventeen of the animals of the herd (in addition to the above cow) were giving milk containing pus. Fifteen of these animals had indurated udders; one had a bunch on her udder, and a tumor was discovered on the udder of another cow. The milk from another animal contained pus, by reason of three of the cow's teats having been cut by the finger nails of the milker.

22. Cow had an injured teat. The milk from the remaining quarters was being used, and as the trouble with the cow's udder was not confined to the injured quarter, the milk was contaminated with pus and streptococci.

23. Two cows with mammitis.

24. This cow was purchased at Brighton shortly after calving. She was then driven to the dairy; subsequent to her arrival the afterbirth came away. The milk from this animal was used and found to be abnormal. A later examination of the cow showed one teat to be obstructed.

25. One cow with a bad teat.

26. Cow with boil on her udder.

27. Drying up one cow.

28. One gargety cow and two cows giving "stringy milk."

29. Cow with garget in one quarter of udder.

EFFORTS OF DEALERS TO IMPROVE MILK SUPPLIES.

During 1908 the contracting firms made 41,474 bacteriologic examinations of milk, the most of these being upon their own supplies. Of these samples 452, or 1.09 per cent, were found to be contaminated with pus or streptococci. This is a material reduction in the percentage of infected samples, as 3.17 per cent of the milk tested by contractors in 1907 was thus classified. The number of bacteriologic examinations exceed those of any year since the commencement of this work. One concern, which made none of these examinations in 1908, returns this significant comment, "No records kept."

All of the firms engaged in this line of investigation are of the opinion that it has been of much benefit to their supplies. One firm reports a material improvement, which from 1906 to 1907 was striking in reduction of number of cases of high bacteria and of high temperature, but that the gain in 1908, while real, was not so marked. Another concern believes that it has done a great deal of good, and that producers are beginning to understand what they must do, and realize the consequences of dirt, carelessness and neglect. One firm warns its dairymen where the bacteria exceed 250,000, and also sends the additional information that the milk will be excluded unless immediate improvement follows. Where milk was found containing high bacteria, the investigations have been instituted, and dairymen cautioned and instructed as to methods of cleanliness. One concern makes frequent re-examinations of supplies, and sends their inspectors to the dairy to advise the farmer. Another company attempts to trace the trouble back to the dairy, and correct poor methods. The concern also stopped buying milk from some dairies where

objectionable conditions existed. A third firm notifies the dairy, and where two or three consecutive samples are high in bacteria the dairy is dropped.

If milk is contaminated with pus and streptococci, one concern sends its veterinarian to inspect the herds; the unhealthy cattle are quarantined, and the milk is rejected until free from infection. Several firms send for samples of milk for examination from the individual cows at a dairy, and when the faulty cows are discovered by this means their product is excluded from the supply until such time as normal conditions prevail. Some concerns have shut off entire dairies until the milk becomes normal. One contractor compels dairymen to employ a veterinarian to examine the cattle, the results being reported to the firm; in this manner the product of unhealthy stock is excluded.

In the matter of improving supplies many of the contractors have been alert, and there has never been so much dairy inspection on the part of these concerns as during 1908. One firm uses a veterinarian for this purpose. This company has instituted a system of extra payments to dairymen where commendable stable conditions exist and where no samples above 50,000 bacteria are obtained during a month. In the winter this premium averages nearly two cents a can, and last summer was about five cents a can; eleven dairies were dropped by this firm because of high bacteria and bad stable conditions. Another concern, which has an inspector to instruct producers as to proper methods of care and cooling, dropped five dairies where the owners were unwilling to provide adequate equipment. Two of the farmers later made satisfactory changes, and the milk is now coming to this market. Another company has trained and experienced men visiting the dairies, and these inspections have been more frequent than formerly. The system of score cards used seems to denote an improvement. Some stubborn producers would not clean up, and where proper facilities were lacking the milk has been refused. Because of these reasons four dairies were stopped permanently. One company employed an extra man to devote his time to dairy work, and very recently another man was secured for the same work. It is stated that good results are already noted, and there is confidence that conditions will be much better. With another firm there has been a tightening of old lines, not only in dairy inspection but in oversight of plant, methods and supervision of employees' health.

Not all of the contractors have assisted in work of betterment, but the majority have rendered commendable aid.

Efforts have also been made to improve the conditions surrounding the handling of milk after it reaches this city. This includes icing of milk and its protection by covers while in wagons. Drivers are also required to observe rules for the care of milk, and there has been a general overhauling of methods with a view to lessen contamination.

LOW TEMPERATURE AN IMPORTANT FACTOR.

While cleanliness is a necessary factor to good milk supplies, an accompanying essential, and one which can be complied with by every producer in this section of the United States, is that of an ample ice supply intelligently used. Dairymen of the present day should have acquired sufficient knowledge of the elements of proper milk production to recognize the necessity of cooling their milk quickly, and then maintaining a low temperature until the milk is delivered at the cars or to customers. Those who have not advanced their methods to the required degree, however, should have the need for quick and thorough refrigeration of milk products speedily instilled into them. The old devices, oftentimes worse than useless, and characteristic of many milk farms, are antiquated and can no longer be tolerated. Ice in abundance, freely and intelligently used, is as essential to the production of what is now recognized as milk as is the cow, and no farm is equipped for the raising of good milk unless due attention is paid to the ice issue. The time for excuses on this score is past; and while there may be opportunities for differences of opinion concerning other essentials of good milk raising, there can be none regarding either refrigeration or its feasibility. The procuring of an ice supply in New England cannot be viewed as an expensive or impossible proceeding, and every dairy should annually store an ample supply to last not only through the heated periods of ordinary years, but there should also be sufficient ice for the years of extreme high temperature or where the warm weather is of long duration. The past year amply illustrates the danger of dependence on the minimum ice crop, as the amount normally stored proved insufficient for the prolonged warm weather of that period. It was further demonstrated that more ice should be stored, and that, if necessary, ice houses should be enlarged to provide space for the extra amount cut. This ice problem in its relation to milk supplies is not a fad but a necessity, and should be considered as much a factor of the conduct of a dairy farm as is the fuel for household or heating purposes or the food required by the stock.

Having the necessary ice, it must be employed, to accomplish the desired end, without stint and whenever the temperature is such as to require it, and that means the greater part of the year, even in this climate. Its use should be commenced early in the year, much sooner than has been deemed necessary heretofore, and should not be discontinued until the occasion for the employment is over.

Every contractor and milkman who purchases milk or cream from dairymen should make it a point to patronize only those farmers who have ample supplies of ice and who use it freely and intelligently. The frequent use of a thermometer would be of value, not only in the purchase of milk but also in furnishing information as to the efficiency of their own methods of cooling.

While it is true that a more determined effort is being made than ever before by dairymen supplying Boston with milk to keep it cold, progress in this direction is far from having reached the perfection desired. Neither can any doubt exist that the regulation of the Boston Board of Health and its enforcement has had much to do with the advance already made in the refrigeration of milk in the country which is intended for this market.

There is one subject which requires further notice, and that is the method pursued by some dairymen in the handling of milk in the extreme cold weather. In their eagerness to prevent the freezing of the supply the milk is oftentimes taken into the kitchen, and not infrequently placed behind the stove. Thus it is likely to be kept at a high temperature for several hours, affording opportunity for rapid bacterial development. Samples actually subjected to this kitchen treatment have been found to contain bacteria running into the millions. Warm kitchens, whether in farmhouses or elsewhere, do not afford desirable surroundings for the proper storage of milk. Contractors should instruct producers to keep supplies under other conditions.

At least one of the contracting firms has taken a lesson from the long heated period of 1908, and has cut and stored an extra supply of ice against the occurrence of similar conditions in 1909. Most of the local milk dealers are using commendable efforts to keep the milk cold after it comes into their possession and the expense for ice forms an item of considerable magnitude. There has been much complaint concerning the regulation, but there is no difficulty in complying with its provisions if ice is freely employed. Many shopkeepers are making earnest efforts to conform to this regulation by endeavoring to keep their milk cold while it is on sale. But there

is one difficulty with store milk in summer to which attention has already been directed, namely, that in many instances it is left outside shops in the early morning hours, and in summer, especially if the sun shines upon the cans, the temperature of the milk is greatly increased. Arrangements should be made between milkman and shopkeeper to protect the milk from high temperature periods. The same forethought is required when milk is left to householders. Doorsteps, with or without the aid of direct sunlight, are not proper places to keep milk in good condition. Milk thus handled is likely to be high in bacterial content and to keep poorly. Householders should also use care to keep their milk properly refrigerated and free from dust and dirt. The best milk may be quickly spoiled by careless treatment, and consumers owe it to themselves and to dealers to exercise the utmost precaution for the protection of their supplies. It would be advantageous to milkmen if they would actively assist in the education of all customers, whether householders or shopkeepers, concerning the proper handling of milk and the necessity therefor.

Many temperature tests were taken during the year, probably more than 11,500, in the enforcement of this regulation, and 278 warnings were issued, calling attention to its requirements. Of these warnings, 133 represented milk as it arrived from the country; these notifications were sent to the contractor, but eventually they reached the dairymen who sold the milk. Where it was found that warnings failed to bring the results desired, prosecutions were instituted; fines as high as \$25 were imposed by the courts. While court proceedings have been of assistance in enforcing this regulation, the method is an indirect one and incapable of accomplishing quickly the end sought; and in any event the objectionable milk with high temperature is delivered to consumers and used by them. It would seem to be preferable to immediately destroy this high temperature milk rather than to permit its sale; and consideration of the plan for thus disposing of it is urged.

CREAM.

Practically all of the cream sold in this city conforms to the standard for fat of 15 per cent established by law. Violations are infrequent, and where they occur the seller is usually some shop or restaurant keeper. But while the cream supplied here complies with the law for fat content, its production is surrounded with two important and condemnable features, namely, the age of the product, coupled with the fact that the milk from which the cream is obtained is produced at farms

over which the dealers have practically no oversight. Fully 95 per cent of the cream sold in Boston comes under one or both of the objections indicated. When it is known that in summer a small amount of cream, when delivered to customers, is from 36 to 72 hours old, while the bulk of it is from 84 to 108 hours old, and that in winter this commodity is from 120 to 144 hours old, it is seen that the element of freshness is somewhat remote.

Farm inspection, when the milk is converted into cream, is a negligible factor, and undoubtedly very few of the farms from which this milk is obtained have attained the dignity of dairies. In fact, from the data procurable, it is not unfair to assume that many of the places raising milk for cream purposes have never been visited by representatives from the creameries or firms buying the milk or thin cream which later is marketed here as cream of varying degrees of density. Produced with this lack of oversight, the reason that no firm makes any claim as to the cleanliness of its product is apparent. While few of the creamery owners have any knowledge of the condition on the farms from which their product is obtained, many of the proprietors of farms supplying the milk or thin cream seldom, if ever, visit the creameries purchasing their products. Distance of many of these farms from the creameries and the small amount of milk produced by a majority of them is responsible for a system by which the bulk of the product is taken to the creameries by collectors,—individuals who go to a number of farms with a team, procure and transport the milk or thin cream to the creamery. These farms are scattered all over Northern New England as well as some parts of New York State. Very little milk produced in this state is converted into cream, and of the 84 creameries known to be supplying this market only four are located within the state. During periods of scarcity cream also comes here from creameries not included in the above number, which further lessens the probability of knowledge of farm conditions; in fact, some of the local dealers possess no information as to the creameries from which they procure either regular or temporary supplies. Hence it is seen that creamery owners and dealers do not as a rule investigate the production or preparation of the product they handle, and that the clean milk issue has yet to gain a foothold in the cream business.

Infrequent collections of milk and cream from farmers, especially in winter, combined with irregular shipments of finished product to the trade centers, are further drawbacks to the procuring of fresh cream. The above methods of collections and shipments are followed to save expense, but

no dealer in cream will claim that the quality is improved thereby. These lax systems are made possible by the fact that at all of the creameries the cream is heated before being sent to market. If it were not for this the cream business would have to be conducted on a very different basis, and undoubtedly the amount of product would be materially curtailed. Thus the easy method of heating is the substitute for farm inspection, quick transportation and delivery.

Despite all of these adverse conditions governing production and handling the demand for cream is constantly increasing, and where in former years this substance was deemed a luxury it is now considered almost a necessity. The sale of cream on days preceding the Sabbath and holidays is very large, and oftentimes there is difficulty in securing enough to supply purchasers.

Last year about 770,000 gallons of light cream, containing from 15 to 20 per cent of fat, and 490,500 gallons of heavy cream, containing from 35 to 44 per cent of fat, were consumed in this city. In addition to this, probably about 750,000 gallons of cream were shipped from this city to supply trade elsewhere. Much of the thin cream is prepared here by diluting the heavy cream with milk or skimmed milk. This is done to save transportation charges, the heavy cream being less bulky than the light variety. There is much petty fraud in the matter of fat content of the heavy cream, and the above wide trade range of 35 per cent to 44 per cent of fat (there being no legal standard for heavy cream) proves this to be a possibility. Cream is bought and sold in large quantities by the percentage of fat it contains, and while the dealer has an opportunity to ascertain if purchases comply with representation, the buyer at retail has no such advantage and has to depend upon the dealer who supplies him. A slight difference in fat content in heavy cream is not apparent to casual observation, and in consequence much cream under 40 per cent is sold as cream having 40 per cent to 44 per cent of fat. To illustrate this variation the following results, recently obtained from commercial creams, are given:

NUMBER.	Per Cent of Fat.	Per Cent Total Solids.
1.....	31.69	36.36
2.....	32.22	40.50
3.....	35.03	41.06
4.....	35.33	37.78

NUMBER.	Per Cent of Fat.	Per Cent Total Solids.
5.....	36.93	40.62
6.....	37.61	41.78
7.....	38.50	41.39
8.....	38.75	42.71
9.....	39.16	41.66
10.....	39.63	43.32
11.....	39.70	41.82
12.....	39.72	42.70
13.....	39.86	43.78
14.....	40.00	43.45
15.....	40.00	43.53
16.....	40.00	43.73
17.....	40.10	43.23
18.....	40.50	44.13
19.....	41.52	45.03
20.....	42.02	47.07
21.....	43.50	46.54
22.....	43.74	49.09
23.....	43.76	46.95
24.....	47.50	49.69

Thus it will be seen that while many of the specimens contain 40 per cent or upwards of fat a majority contain less than 40 per cent of fat. No doubt these latter creams were intentionally made so, and their sale, when compared to the specimens with a high percentage of fat, yields a handsome profit to the dealer, defrauding at the same time the consumer.

The heating which cream undergoes at the creameries makes the product thin, and to restore it to the original condition, or give it the same viscous property it possessed before heating, has exercised the ingenuity of the dealers to a considerable extent. Recently it was found that some firms were using a substance known to the trade as "viscogen," a dense fluid also designated as calcium succate and succate of lime. This is made from slaked lime and syrup, and was being prepared and used in cream sold here from the following formula:

Lime..... 8 pounds
 Sugar..... 20 pounds

Slake the lime in three gallons of water and dissolve the sugar in five gallons of water. When cool mix the above, and after settling pour off the clear liquid.*

This is used in varying amounts, but was being employed here in the proportion of one-half pint to ten gallons of cream, and used in that amount it accomplishes the desired purpose; in fact, if sufficient viscogen is used, a very thin cream has the appearance of a cream containing a large amount of fat. As viscogen is a substance foreign to milk its employment is a violation of law. By reason of the investigations made concerning the use of this substance and the court cases which resulted, the cream now offered for sale is free from this admixture.

BUTTER.

The sale of renovated butter has decreased to a pronounced extent not only in this city; but in other sections of the state. The methods of dealing in this product have also changed. Formerly much of this butter was sold to shopkeepers in tubs, but now a large proportion goes to retailers in boxes containing the butter in pound, wrapped and labeled packages. These papers are usually marked "renovated butter," but not infrequently they bear the words "process butter." The latter wording is not in compliance with the law of this state, and the size of type employed for either style of wording is usually too small. Further, even though the wording and size of letter are correct, if these pound packages are wrapped in other and unmarked papers the law is violated. The outer wrapper must be marked with the words "renovated butter" in one-half inch uncondensed gothic letters.

This decrease in the renovated butter traffic has lessened the number of dealers handling the product, and in consequence there are fewer violations of the law. In fact, most of the sellers of this substance are carefully complying with the legal requirements, and this is demonstrated by the small number of cases during the year (nine) as compared with the preceding year, when there were thirty-nine violations.

OLEOMARGARINE.

No doubt the lessening of traffic in renovated butter is largely due to the ascendancy of oleomargarine. Much of the demand for this latter commodity appears to be founded upon merit, as it is being sold in most instances in this city with-

* An analysis of one of these commercial samples showed it to contain 5.36 per cent of calcium oxide, while a laboratory specimen made approximately as above yielded 5.47 per cent of calcium oxide.

out deception. It is thus having an opportunity to become established in the opinion of the purchasing public upon a firm and business-like basis, and minus the artifices which surrounded its sale in former years. This fraud, which was general, did much to develop the opposition against oleomargarine, and was largely responsible for the vast amount of legislation, regulative and prohibitive, which was so generally adopted throughout the United States. Undoubtedly the legal decision in this state, which permits oleomargarine to have a yellow color and appear like butter, provided the color is due to the materials "needful to the production of oleomargarine," is responsible for much of this increase of business in oleomargarine. Manufacturers make it a point to see that something is necessary to the production of their oleomargarine which will give the compound a yellow color. There is no doubt that this coloring increases the popularity of the product, and at the same time there is no just reason why color should not be permitted in oleomargarine, as long as it is countenanced in butter.

The majority of oleomargarine cases during the year were for serving the substance in restaurants and dining rooms without giving notice to guests.

There were thirty-five of these cases as against twenty-six during the preceding year. There are now forty-five dealers licensed to sell oleomargarine in this city, where there were only thirty-three in 1907-08. In three years the number of registered dealers has trebled.

Preservatives were not found in any of the specimens of butter or oleomargarine tested during the year.

VINEGAR.

Conditions appertaining to the vinegar business have undergone little change in the last year. There has been a tendency, however, to discontinue the use of the designations "red" "brown," and "standard" as applied to vinegars of a color resembling that of cider. These vinegars were not made from cider but were oftentimes sold for the product made from the apple, and they were well adapted for deceiving purchasers. The majority of these vinegars were prepared from white, or spirit, vinegar, colored with caramel, but as a vigorous campaign has been waged against the use of coloring agents in vinegar, the sale of such vinegars has been reduced to a minimum.

As a substitute for the above fancifully named products, vinegars made from syrup, molasses or brown sugar are now

being offered. These vinegars are for the most part darker colored than those manufactured from cider, but it is not unusual for retail dealers to sell them as and for cider. In fact many storekeepers dealing in these vinegars will sell them to customers who ask for cider vinegar, apparently fearing that unless they employ deceptive methods a sale may be lost. These syrup, molasses or sugar vinegars are usually sold by manufacturers for what they are, unless they are mixed with the product made from apple juice, and then the mixture is always marketed for cider vinegar. It seems to be no violation of vinegar ethics to apply the name sugar to a vinegar made from syrup or molasses, or, in fact, to use any other term best suited to the interests of manufacturers or the whim of retailers. But such interchange is not in violation of law. There is much competition in the vinegar business, and as an illustration of the efforts made to secure trade, fictitious syrup vinegar, made outside this state, has been offered for sale within the year in this market.

Carefully prepared imitations of cider vinegar are constantly being offered for sale, and only last summer a two carload shipment, sold by one manufacturer to another manufacturer (who at that time had a scant supply of cider vinegar), was deemed to be spurious and the receipt of the goods refused. This vinegar was then shipped to a neighboring city, where it was sold for a price considerably under that which had prevailed for cider vinegar. Naturally this condition caused serious interference with the market for pure cider vinegar.

Most of the imitations of cider vinegar are cleverly devised, and manufacturers have stated that mixtures can be prepared which will defy analytical skill to prove their falsity. In fact, many of the present day imitations of cider vinegar were instigated by chemists, and the subject thus becomes one of experts, namely, those attempting to detect fraud and those endeavoring to prevent its discovery. At this time, owing to the small apple crop of 1908, there is abundant temptation for the cider vinegar adulterator, scarcity of product meaning high prices and much juggling and compounding to supply the usual demand. While some vinegar dealers are honorable, the brand of honesty attachable to the majority is largely commercial.

There is safety for the public, however, in the fact that white, or spirit, vinegar defies the machinations of the adulterator, *i. e.*, it is always pure and is as good for any purpose as cider or any other brand of vinegar. Moreover, it is much cheaper, and if consumers would use this vinegar to the

exclusion of that supposed to be made from cider and other substances, those engaged in the preparation of these spurious products would soon be without the temptation to adulterate. Custom, and that alone, is responsible for the demand for cider vinegar, but custom causes the public to pay large money tribute to the skill of the vinegar manipulator. Consumers should abandon custom and the gross saving would thereby be large.

Many of the prosecutions for the year were for the sale of vinegar not the product of pure apple juice for cider vinegar; other cases were brought where vinegars lacked acid strength, or where cider vinegar was materially deficient in residue.

COURT CASES.

A summary of the year's prosecutions follows:

For sale, or possession, or custody with intent to sell, of milk not of good standard quality	218
For possession, with intent to sell, of milk containing added water	42
For sale of cream containing less than 15 per cent milk fat	3
For possession of cream containing calcium sucrate	9
For sale of milk without the necessary permits	2
For possession or custody, with intent to sell, of skimmed milk containing less than 9.3 per cent of solids, exclusive of fat	2
For misuse of milk vessels	4
For tasting milk, intended for sale, in a manner pro- hibited by the Board of Health	11
For failure to clean milk cans immediately upon empty- ing the same	2
For milk having a temperature higher than 50 degrees Fahrenheit	36
For sale of adulterated cider vinegar	3
For sale of adulterated vinegar	5
For sale of vinegar not made from cider as cider vinegar	25
For sale of renovated butter not properly marked	9
For sale of oleomargarine as butter	2
For sale of oleomargarine unmarked	2
For sale of oleomargarine without the necessary permits	3
For exposing unmarked oleomargarine for sale	3
For peddling oleomargarine from an unmarked wagon	1
For furnishing oleomargarine in a restaurant	35

The results of prosecutions were as follows:

Number of warrants returned without service	4
Number of cases in which defendants ran away	2
Number of cases on file	35
Number of cases dismissed on motion of complainant	8
Number of acquittals	5
Number of convictions	363
	<hr/>
	417
	<hr/>

Income.

The amount paid in fines was	\$6,866 00
Receipts from license fees	840 50
	<hr/>
Total	\$7,706 50

Respectfully submitted,

JAMES O. JORDAN,
Inspector.

REPORT OF SUPERINTENDENT OF PEDDLERS.

BOSTON, February 1, 1909.

To the Board of Health:

GENTLEMEN,—I have the honor to submit the following report for the year ending January 31, 1909:

Licenses to remove bones, grease, etc., were granted to 67 persons, their teams to be examined the first of each month.

The examinations made in February were 62; March, 63; May, 64; June, 65; July, 59; August, 63; September, 66; October, 66; November, 61; December, 64; and in January, 64.

One hundred and twenty-seven licenses were granted during the year to remove manure—all of which expire April 30, 1909.

Six hundred and twenty-five numbers were assigned to peddlers.

In February 338 vehicles were inspected; March, 348; April, 354; May, 341; June, 367; July, 377; August, 404; September, 425; October, 345; November, 383; December, 320; January, 397. The vehicles and receptacles of persons licensed by the Board of Health are kept clean and in good condition, except the manure wagons. Much time has been used to compel owners and drivers of manure wagons and wagons of contractors collecting swill to keep them clean, and while a marked change for the better is to be noted there is still chance for improvement.

The City Collector has received in fees from peddlers \$5,320, of which \$4,700 was for city and \$620 for county licenses.

There were granted during the year:

Numbers assigned	963
Licenses to collect bones, etc.	76
License to remove manure	127
City licenses — Secretary of State	188
County licenses — Secretary of State	155

Respectfully submitted,

JOHN McLOUGHLIN,
Superintendent of Peddlers.

FINANCIAL STATEMENT.

Expended to January 31, 1909.

Board of Health:		
Two commissioners	\$7,077 77	
One chairman	4,500 00	
		\$11,577 77
Clerk hire		11,645 31
Messenger service, salary of messenger and extra service		672 35
Sanitary inspectors, including one inspector of gas fixtures and five police officers		34,923 49
Medical inspectors, including one veterinarian		11,577 77
Constables		1,643 58
Inspector of provisions and of animals intended for slaughter		1,444 22
Smoke inspector		138 08
Disinfection:		
Labor	\$14,449 44	
Expense of horses and vehicles	2,633 50	
Other expenses	3,040 55	
		20,123 49
Smallpox Hospital:		
Labor	\$1,679 64	
Subsistence	280 00	
Fuel	666 25	
Repairs	426 67	
Other expenses	384 64	
		3,437 20
Medical inspection of schools:		
Eighty inspectors (annual salary, \$200)		15,997 19
Care of scarlet fever		8,879 85
Laboratory:		
Salaries	\$8,501 99	
Materials	3,136 74	
Culture Stations	1,382 20	
Other expenses	578 87	
		13,599 80
Supplies for sanitary inspectors		543 60
Morgue:		
Salaries	\$1,622 90	
Alterations and repairs	411 91	
Supplies	296 45	
Carried forward		\$136,203 70

HEALTH DEPARTMENT.

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<i>Brought forward</i>		\$136,203 70
Fuel	212 46	
Other expenses	787 42	
		3,331 14
Postage		3,418 26
Telephones		2,388 50
Traveling expenses—officers		2,083 37
Office expenses		835 79
Horses and vehicles:		
Board	\$1,537 50	
Shoeing	189 00	
Repairs	248 40	
New blankets	25 00	
		1,999 90
Stationery		595 44
Printing		5,454 39
Advertising		72 43
Examination of plumbers and gas fitters		270 00
Inspection of milk and vinegar:		
Salaries	\$9,063 00	
Horse and vehicle	939 53	
Supplies	393 35	
Other expenses	742 75	
		11,138 63
Inspection of provisions:		
Paid for salaries		3,759 82
Superintendent of peddlers	\$1,300 00	
Assistant superintendent of peddlers (per day), \$3	1,152 19	
		2,452 19
Removal of buildings		2,147 87
Towns and cities for care of patients sick with contagious diseases, having a settlement in Boston		3,872 07
Tenement house division		76 39
Plumbing division		76 39
Sundry expenses		194 45
<i>Quarantine.</i>		
Port physician and assistant, salaries		2,856 93
Medicine		10 67
Contingencies		101 40
Gallop's Island:		
Labor	\$3,905 43	
Subsistence	2,137 08	
Repairs	554 93	
Supplies	2,005 00	
		8,602 44
<i>Carried forward</i>		\$191,942 17

<i>Brought forward</i>		\$191,942 17
Steamer "Vigilant":		
Salaries	\$7,750 00	
Subsistence	1,650 99	
Repairs	1,468 92	
Supplies	433 69	
Fuel	2,620 70	
	<hr/>	13,924 30
Steamer "Relief," repairs		389 27
Total		<hr/> <u>\$206,255 74</u>

INCOME.

Quarantine:		
Fees (incoming vessels)	\$4,190 00	
Disinfection	585 00	
Board of patients	1,837 00	
	<hr/>	\$6,612 00
Inspection of milk and vinegar (licenses)		842 00
Total		<hr/> <u>\$7,454 00</u>

C. E. DAVIS, JR.,
Chief Clerk.

